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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 003386.P002X2

Total Pages 3

First Named Inventor or Application Identifier David L. Gilmour

Express Mail Label No. EL672753222US

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, D. C. 20231

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. X Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)
2. X Specification (Total Pages 89)
(preferred arrangement set forth below)
 - Descriptive Title of the Invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to Microfiche Appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claims
 - Abstract of the Disclosure
3. X Drawings(s) (35 USC 113) (Total Sheets 49)
4. X Oath or Declaration (Total Pages 5, unsigned)
 - a. Newly Executed (Original or Copy)
 - b. Copy from a Prior Application (37 CFR 1.63(d))
(for Continuation/Divisional with Box 17 completed) (**Note Box 5 below**)
 - i. DELETIONS OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
5. Incorporation By Reference (useable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. Microfiche Computer Program (Appendix)

09/703189 10/31/00

7. _____ Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
a. _____ Computer Readable Copy
b. _____ Paper Copy (identical to computer copy)
c. _____ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. _____ Assignment Papers (cover sheet & documents(s))
9. _____ a. 37 CFR 3.73(b) Statement (where there is an assignee)
_____ b. Power of Attorney
10. _____ English Translation Document (if applicable)
11. _____ a. Information Disclosure Statement (IDS)/PTO-1449
_____ b. Copies of IDS Citations
12. _____ Preliminary Amendment
13. X _____ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
14. _____ a. Small Entity Statement(s)
_____ b. Statement filed in prior application, Status still proper and desired
15. _____ Certified Copy of Priority Document(s) (if foreign priority is claimed)
16. X _____ Other: Associate Power of Attorney
Letter Regarding Limited Recognition

17. **If a CONTINUING APPLICATION**, check appropriate box and supply the requisite information:
____ Continuation _____ Divisional X Continuation-in-part (CIP)
of prior application No: 09/157,093

18. Correspondence Address

____ Customer Number or Bar Code Label _____
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or

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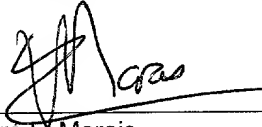
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Respectfully submitted,

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Date: 10/31/00

By


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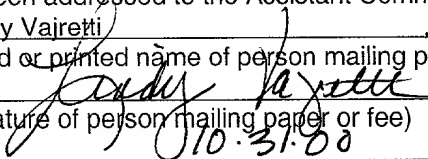
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09/703189

**FEE TRANSMITTAL FOR FY 2001****TOTAL AMOUNT OF PAYMENT (\$)** 934.00**Complete if Known:**

Application No. New application
 Filing Date Herewith
 First Named Inventor David L. Gilmour
 Group Art Unit New application
 Examiner Name New application
 Attorney Docket No. 003386.P002X2

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account Number 02-2666
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☒ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17

2. ☒ Payment Enclosed:

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FEE CALCULATION**1. BASIC FILING FEE**

Large Entity		Small Entity		Fee Description	Fee Paid
Code	Fee (\$)	Code	Fee (\$)		
101	710	201	355	Utility application filing fee	<u>710.00</u>
106	320	206	160	Design application filing fee	_____
107	490	207	245	Plant filing fee	_____
108	710	208	355	Reissue filing fee	_____
114	150	214	75	Provisional application filing fee	_____

SUBTOTAL (1) \$ 710.00**2. EXTRA CLAIM FEES**

		Extra Claims	Fee from below	Fee Paid
Total Claims	<u>28</u>	- 20** = <u>8</u>	X <u>18.00</u>	= <u>144.00</u>
Independent Claims	<u>4</u>	- 3** = <u>1</u>	X <u>80.00</u>	= <u>80.00</u>
Multiple Dependent				= _____

**Or number previously paid, if greater; For Reissues, see below.

Large Entity		Small Entity		Fee Description
Code	Fee (\$)	Code	Fee (\$)	
103	18	203	9	Claims in excess of 20
102	80	202	40	Independent claims in excess of 3
104	270	204	135	Multiple dependent claim, if not paid
109	80	209	40	**Reissue independent claims over original patent
110	18	210	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) \$ 224.00

001001:68FED460

FEE CALCULATION (continued)

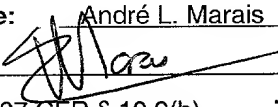
3. ADDITIONAL FEES

<u>Large Entity</u>		<u>Small Entity</u>		<u>Fee Description</u>	<u>Fee Paid</u>
<u>Code</u>	<u>Fee (\$)</u>	<u>Code</u>	<u>Fee (\$)</u>		
105	130	205	65	Surcharge - late filing fee or oath	_____
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	_____
139	130	139	130	Non-English specification	_____
147	2,520	147	2,520	For filing a request for reexamination	_____
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	_____
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	_____
115	110	215	55	Extension for response within first month	_____
116	390	216	195	Extension for response within second month	_____
117	890	217	445	Extension for response within third month	_____
118	1,390	218	695	Extension for response within fourth month	_____
128	1,890	228	945	Extension for response within fifth month	_____
119	310	219	155	Notice of Appeal	_____
120	310	220	155	Filing a brief in support of an appeal	_____
121	270	221	135	Request for oral hearing	_____
138	1,510	138	1,510	Petition to institute a public use proceeding	_____
140	110	240	55	Petition to revive unavoidably abandoned application	_____
141	1,240	241	620	Petition to revive unintentionally abandoned application	_____
142	1,240	242	620	Utility issue fee (or reissue)	_____
143	440	243	220	Design issue fee	_____
144	600	244	300	Plant issue fee	_____
122	130	122	130	Petitions to the Commissioner	_____
123	50	123	50	Petitions related to provisional applications	_____
126	240	126	240	Submission of Information Disclosure Stmt	_____
581	40	581	40	Recording each patent assignment per property (times number of properties)	_____
146	710	246	355	For filing a submission after final rejection (see 37 CFR 1.129(a))	_____
149	710	249	355	For each additional invention to be examined (see 37 CFR 1.129(b))	_____
179	710	279	355	Request for Continued Examination (RCE)	_____
169	900	169	900	Request for expedited examination of a design application	_____
Other fee (specify) _____					_____
Other fee (specify) _____					_____

SUBTOTAL (3) \$ NA

*Reduced by Basic Filing Fee Paid

SUBMITTED BY:

Typed or Printed Name: André L. Marais
 Signature:  Date: 10/31/00
 Reg. Number: Under 37 CFR § 10.9(b) Telephone Number: (408) 720-8300

UNITED STATES PATENT APPLICATION
FOR
METHOD AND SYSTEM FOR ADDRESSING A COMMUNICATION
FOR TRANSMISSION OVER A NETWORK BASED ON THE CONTENT
THEREOF

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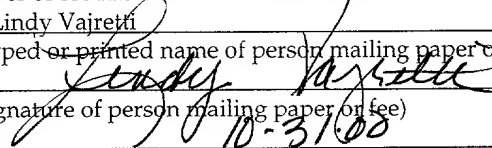
Attorney's Docket No. 003386.P002X2

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003386.P002X2

**METHOD AND SYSTEM FOR ADDRESSING A COMMUNICATION
DOCUMENT FOR TRANSMISSION OVER A NETWORK BASED ON
THE CONTENT THEREOF**

5

This application is a continuation-in-part of U.S. patent application
no. 09/157,093, filed September 18, 1998, and entitled "METHOD AND
APPARATUS FOR ADDRESSING AN ELECTRONIC DOCUMENT FOR
TRANSMISSION OVER A NETWORK".

10

FIELD OF THE INVENTION

The present invention relates generally to the field of knowledge
management and, more specifically, to a method and system to address a
communication for transmission over a computer network based on the
content of the communication.

15

BACKGROUND OF THE INVENTION

The new field of "knowledge management" (KM) is receiving
increasing recognition as the gains to be realized from the systematic effort
to store and export vast knowledge resources held by employees of an
organization are being recognized. The sharing of knowledge broadly
within an organization offers numerous potential benefits to an organization
through the awareness and reuse of existing knowledge, and the avoidance
of duplicate efforts.

25

In order to maximize the exploitation of knowledge resources within an organization, a knowledge management system may be presented with two primary challenges, namely (1) the identification of knowledge resources within the organization and (2) the distribution and accessing of information regarding such knowledge resources within the organization.

The identification, capture, organization and storage of knowledge resources is a particularly taxing problem. Prior art knowledge management systems have typically implemented knowledge repositories that require users manually to input information frequently into pre-defined fields, and in this way manually and in a prompted manner to reveal their personal knowledge base. However, this approach suffers from a number of drawbacks in that the manual entering of such information is time consuming and often incomplete, and therefore places a burden on users who then experience the inconvenience and cost of a corporate knowledge management initiative long before any direct benefit is experienced.

Furthermore, users may not be motivated to describe their own knowledge and to contribute documents on an ongoing basis that would subsequently be re-used by others without their awareness or consent. The manual input of such information places a burden on users who then experience the inconvenience and cost of a corporate knowledge management initiative long before any direct benefit is experienced.

It has been the experience of many corporations that knowledge management systems, after some initial success, may fail because either

compliance (i.e., the thoroughness and continuity with which each user contributes knowledge) or participation (i.e., the percentage of users actively contributing to the knowledge management system) falls to inadequate levels. Without high compliance and participation, it becomes a practical impossibility to maintain a sufficiently current and complete inventory of the knowledge of all users. Under these circumstances, the knowledge management effort may never offer an attractive relationship of benefits to costs for the organization as a whole, reach a critical mass, and the original benefit of knowledge management falls apart or is marginalized to a small group.

In order to address the problems associated with the manual input of knowledge information, more sophisticated prior art knowledge management initiatives may presume the existence of a centralized staff to work with users to capture knowledge bases. This may however increase the ongoing cost of knowledge management and requires a larger up-front investment before any visible payoff, thus deterring the initial funding of many an otherwise promising knowledge management initiatives. Even if an initial decision is made to proceed with such a sophisticated knowledge management initiative, the cash expenses associated with a large centralized knowledge capture staff may be liable to come under attack, given the difficulty of quantifying knowledge management benefits in dollar terms.

As alluded to above, even once a satisfactory knowledge management information base has been established, the practical utilization

thereof to achieve maximum potential benefit may be challenging.

Specifically, ensuring that the captured information is readily organized, available, and accessible as appropriate throughout the organization may be problematic.

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SUMMARY OF THE INVENTION

According to the present invention, there is a method of addressing a communication for transmission over a network. A descriptive profile of a potential recipient of the communication is accessed. The potential recipient
5 is identified as a suggested recipient based on a correspondence between content of the communication and content of the descriptive profile. The suggested recipient is presented to a sender of the communication in conjunction with an indication of the correspondence between the content of the communication and the content of the descriptive profile.

10 Other features of the present invention will be apparent from the accompanying drawings and from the detailed description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example and not limitation in the figures of the accompanying drawings, in which like references indicate similar elements and in which:

5

Figure 1 is a block diagram illustrating a knowledge management system, according to an exemplary embodiment of the present invention.

10 **Figure 2** is a block diagram illustrating a knowledge site management server, according to an exemplary embodiment of the present invention.

Figure 3 is a block diagram illustrating a knowledge access server, according to an exemplary embodiment of the present invention.

15 **Figure 4** is a block diagram illustrating a knowledge converter, according to an exemplary embodiment of the present invention.

20 **Figure 5** is a block diagram illustrating a client software program, and an e-mail message generated thereby, according to an exemplary embodiment of the present invention.

Figure 6 is a block diagram illustrating the structure of a knowledge repository, according to an exemplary embodiment of the present invention,

as constructed from the data contained in a repository database and a user database.

Figure 7 is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of constructing a user knowledge profile.

Figure 8 is a flowchart illustrating a high-level method, according to an exemplary embodiment of the present invention, by which terms may be extracted from an electronic document and by which confidence level values may be assigned to such terms.

Figure 9A is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of determining a confidence level for a term extracted from an electronic document.

Figure 9B is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, by which a document weight value may be assigned to a document based on addressee information associated with the document.

Figure 10 illustrates a term-document binding table, according to an exemplary embodiment of the present invention.

Figure 11 illustrates a weight table, according to an exemplary embodiment of the present invention.

5 **Figure 12** illustrates an occurrence factor table, according to an exemplary embodiment of the present invention.

10 **Figure 13** illustrates a confidence level table, including initial confidence level values, according to an exemplary embodiment of the present invention.

15 **Figure 14** illustrates a modified confidence level table, including modified confidence level values, according to an exemplary embodiment of the present invention.

20 **Figure 15A** is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of constructing a user knowledge profile that includes first and second portions.

Figure 15B is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of storing a term in either a first or a second portion of a user knowledge profile.

Figure 16A illustrates a user-term table, constructed according to the exemplary method illustrated in Figure 15A.

5 Figure 16B illustrates a user-term table, constructed according to the exemplary method illustrated in Figure 15A.

10 Figure 17A is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of facilitating access to a user knowledge profile.

Figure 17B is a flowchart illustrating an alternative method, according to exemplary embodiment of the present invention, of facilitating access to a user knowledge profile.

15 Figure 17C is a flowchart illustrating a method, according to exemplary embodiment of the present invention, of performing a public profile process.

20 Figure 17D is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of performing a private profile process.

Figure 17E is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of performing a profile modification process.

5 **Figure 18A** is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of addressing an electronic document for transmission over a computer network.

10 **Figure 18B** is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of executing an "explain" function that provides the reasons for the proposal of an e-mail recipient.

15 **Figure 18C** is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of executing a "more" function that proposes further potential recipients for an e-mail message.

20 **Figure 18D** illustrates a user dialog, according to an exemplary embodiment of the present invention, through which a list of potential recipients is displayed to an addressor of an e-mail message.

Figure 19 is a flowchart illustrating a method, according to an exemplary embodiment of the present invention, of managing user authorization to publish, or permit access to, a user knowledge profile.

Figures 24A - 24F illustrate a series of exemplary interfaces (e.g., dialog boxes) that may be presented by a desktop application to facilitate in the addressing of communications based on the content thereof.

- 5 **Figures 25A - 25B** illustrate modifications to an operating system user interface to facilitate the convenient submission of electronic files and documents to a knowledge server.

- 10 **Figures 26A - 26I** illustrate a series of user interface features to facilitate a knowledge search of published terms, and a knowledge sweep of unpublished terms, as contained in a descriptive profile of a user.

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DETAILED DESCRIPTION

A method and system to address a communication for transmission over a network are described. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a
5 thorough understanding of the present invention. It will be evident, however, to one skilled in the art that the present invention may be practiced without these specific details.

OVERVIEW

With a view to addressing the above described difficulties associated
10 with manual knowledge capture either by a profile owner or by a dedicated staff, there is provided a method and apparatus for capturing knowledge automatically, without excessive invasion or disruption of normal work patterns of participating users. Further, the present specification teaches a method and apparatus whereby a database of captured knowledge
15 information is maintained continuously and automatically, without requiring that captured knowledge information necessarily be visible or accessible to others. The present specification also teaches facilitating the user input and modification of a knowledge profile associated with the user in a knowledge database at the user's discretion. The present specification
20 also teaches utilization of knowledge profiles to assist in the addressing (or directing) of communications (e.g., an e-mail message) over a network. This may conveniently be termed "control-directed" communications.

The present specification teaches a method and apparatus for intercepting electronic documents, such as for example e-mail messages, originated by a user, and extracting terms therefrom that are potentially indicative of a knowledge base of the originating user. The extracted

5 knowledge terms may then be utilized to construct a user knowledge profile. The grammatical structure, length, frequency and density with which the extracted knowledge terms occur within electronic documents originated by a user, and prior history of use of the extracted knowledge terms within an organization may furthermore be utilized to attach a metric,

10 in the form of a confidence level value, to the relevant knowledge terms for the purpose of grouping, ranking, and prioritizing such knowledge terms. Knowledge terms may furthermore be stored in either a private or public portion of the user knowledge profile, depending upon the confidence level values thereof. These knowledge terms are then available to be queried, for

15 example to identify a user as having knowledge or interest in a certain area or pertaining to a certain subject.

It will be appreciated that the large volume of e-mail messages traversing an e-mail system over a period of time will contain a large number of terms that may be irrelevant to the identification of the

20 knowledge base of a user. With a view to determining which terms are truly indicative of a knowledge base, a number of rules (or algorithms) may be exercised with respect to extracted terms to identify terms that are candidates for inclusion within a public portion of the user knowledge

profile. Further rules (or algorithms) may be applied to an assembled knowledge profile for the purpose of continually organizing and refining the profile.

Corporate e-mail systems have become increasingly pervasive, and
5 have become an accepted medium for idea communication within corporations. Accordingly, the content of e-mail messages flowing within a large organization amounts to a vast information resources that, over the course of time, may directly or indirectly identify knowledge bases held by individuals within the organization.

10 The present specification also teaches addressing privacy concerns associated with the examination of e-mail messages for the above purposes by providing users with the option selectively to submit originated e-mail messages for examination, or alternatively to bypass the examination and extraction system of the present invention.

15 There is also taught a computer-implemented method and apparatus for addressing an electronic document, such as an e-mail message, for transmission over a computer network. The e-mail message may be examined to identify terms therein. The identified terms are then compared to a number of user knowledge profiles with a view to detecting a
20 predetermined degree of correspondence between the identified terms and any one or more of the user knowledge profiles. In the event that a predetermined degree of correspondence is detected, the sender of the electronic document is prompted to the either accept or decline the proposed

recipient as an actual recipient of the electronic document, after first being offered an opportunity to inspect the specific basis of the correspondence between the identified terms and the proposed recipients. The e-mail message may also be parsed to extract recipients entered manually by the user. The degree of correspondence between the knowledge profiles of the manually entered recipients and the identified terms of the message is then optionally used as the basis of recommendations to the user that certain manually entered recipients be dropped from the ultimate list of recipients.

This aspect of the present teachings is advantageous in that a sender of an e-mail message is presented with a list of proposed recipients, identified according to their knowledge profiles and the content of the e-mail message, who may be interested in receiving the e-mail message. Accordingly, the problems of over-distribution and under-distribution of e-mail messages that may be encountered within an organization may be reduced. Specifically, in the over-distribution situation, many users are frequently copied on e-mail messages, resulting in lost productivity as the users struggle to cope with increasing volumes of daily e-mail. Further, when the time available to read e-mail messages becomes restricted, users typically begin to defer reading of e-mail messages, and communication efficiency within the organization may be adversely affected. In the under-distribution situation, it may occur that the proper recipients of the message are not included in the distribution list, and accordingly fall "out of the loop".

There is also taught a method of facilitating a user profile query or look-up wherein, in response to a match between a query and a user profile, the owner of the user profile may be prompted for authorization to publish all (or a portion) of the user profile to the originator of the query or to others generally. This is advantageous in that it addresses the above mentioned privacy concerns by treating the knowledge profile as a confidential resource under the control of the user. The user is thus also able to control the timing, circumstances and extent to which it is made accessible to others. A further advantage is that the user is prompted for input specifically to satisfy specific, pending requests of others. This relieves the user of the need to remember to modify his or her profile on a regular basis and the need to make decisions concerning the composition of the profile prospectively, prior to any actual use of the profile by others. In this manner the user saves time and effort, since the determination that manual interaction with the profile is necessary is a function of the present system, not a responsibility of the user.

There is also taught a method of assigning a confidence level value to a term within an electronic document. This confidence level value is based on a first quantitative indicator, derived from the number of occurrences of the term within the electronic document, and a second characteristic indicator, derived utilizing the characteristic of the term.

For the purposes of the present application, the word "term" shall be taken to include any acronym, word, collection of words, phrase, sentence,

or paragraph. The term "confidence level" shall be taken to mean any indication, numeric or otherwise, of a level within a predetermined range.

SYSTEM ARCHITECTURE

Figure 1 is a block diagram illustrating a knowledge management system 10, according to an exemplary embodiment of the present invention. The system 10 may conveniently be viewed as comprising a client system 12 and a server system 14. The client system 12 may comprise one or more clients, such as browser clients 16 and e-mail clients 18, that are resident on terminals or computers coupled to a computer network. In one exemplary embodiment, each of the browser clients 16 may comprise the Internet Explorer client developed by Microsoft Corp. of Redmond, Washington, or the Netscape Navigator client developed by Netscape Communications of Menlo Park, California. Each of the e-mail clients 18 may further comprise the Outlook Express, Outlook 97, Outlook 98 or Netscape Communicator e-mail programs. As will be described in further detail below, the browser and e-mail clients 16 are complemented by extensions 19, that enable the e-mail clients 18 to send an electronic message (e.g., either an e-mail or HTML document) to a knowledge server 22 implemented on the server side 14 of the system 10. As shown in **Figure 1**, the extensions 19 may be integral with an e-mail client 18, or external to the client 18 and in communication therewith. The clients 16 and 18 may default to sending every communication to a relevant component of the knowledge server 22, while allowing a user specifically to designate a communication not suitable for

transmission to the knowledge server 22. The user designation may be facilitated through controls that are installed as software modules which interact with or modify an e-mail client 18, and which cause messages to be copied to a special e-mail address (e.g., a Knowledge Server (KS) mailbox 25 maintained by a e-mail server 23) associated with a knowledge server component. In the case where a client extension 19 for performing this automatic transmission is not available, the user can manually add the e-mail address of the KS mailbox 25 to the list of recipients for the message. Further details in this regard are provided below. Files embedded within an e-mail message, such as attachments, may also be selectively included or excluded from the capture process and may also be selectively included or excluded from retention in a knowledge repository.

The browser clients 16 are used as an additional means to submit documents to the knowledge server 22 at the discretion of a user. The browser client 16 is used to access an interface application 34, maintained on a web server 20, which transmits documents to the knowledge server 22.

In alternate embodiments, a client may also propagate a list of bookmarks, folders or directories to the knowledge server 22 for the purpose of user knowledge profile construction.

20

SERVER SIDE ARCHITECTURE

The server side 14 of the system 10 includes a communications server in the exemplary form of the web server 20, the e-mail server 23 and the

knowledge server 22. The web server 20 may be any commercially available web server program such as Internet Information Server (IIS) from Microsoft Corporation, the Netscape Enterprise Server, or the Apache Server for UNIX. The web server 20 includes the interface application 34 for
5 interfacing with the knowledge server 22. The web server 20 may run on a single machine that also hosts the knowledge server 22, or may alternatively run along with the interface application 34 on a dedicated web server computer. The web server 20 may also be a group of web server programs running on a group of computers to thus enhance the scalability of the
10 system 10. As the web server 20 facilitates access to a local view of a knowledge repository 50, maintained by the knowledge access server 26, by the browser clients 16, the web server interface application 34 implements knowledge application interfaces, knowledge management interfaces, user profile creation and maintenance interfaces, and a server management
15 interface. The web server 20 also facilitates knowledge profile queries, e-mail addressing to an e-mail client 18 (or the extension 19), and any other access to the knowledge server 22 using, in one embodiment eXtensible Markup Language (XML) documents and the standard HTTP (web) protocol.

20 The knowledge server 22 includes a knowledge site management server (KSMS) 27 and the knowledge access server (KAS) 26. The knowledge server access 26 includes an interface that provides a local view of a knowledge repository 50, which is physically stored in the user database

56A and a repository database 56B. The knowledge site management server 27 is shown to have access to the local view of the knowledge repository 50 maintained by the knowledge access server 26. The illustrated components of the knowledge server 22 are collectively responsible for the capture
 5 (termed "knowledge discovery") of terms indicative of a user knowledge base and for the distribution of user knowledge profile information. Knowledge discovery may be done by the examination and processing of electronic documents, such as e-mail messages, which may be propagated to the e-mail server 23 from an e-mail client 18 via the Simple Mail Transfer
 10 Protocol (SMTP), as shown at 32. Alternatively, knowledge discovery may be implemented by the examination of submissions from a browser client 16 via the web server 20.

The knowledge server 22 includes the knowledge access server 26 and the knowledge site management server 27 as two separate and distinct
 15 server systems in view of the divergent functions provided by the servers 26 and 27. Specifically, the knowledge site management server 27 functions primarily to manage non-interactive processing (e.g., the extraction of knowledge from inbound e-mail messages), to manage the user information database 56A, and to implement various centralized system management
 20 processes. The knowledge site management server 27 does not communicate interactively with clients 18, or with clients 16 except for administrative functions. The knowledge access server 26, on the other hand, functions primarily to respond to queries and updates from users

submitted via clients, typically browser clients 16. Multiple instances of a knowledge access server 26 may be required to support a large corporate environment and to provide appropriate scalability; however only one knowledge site management server 27, one user database 56A, and one repository database 56B typically exist in a working system. In small scale environments, the web server 20, knowledge access server 26, and knowledge site management server 27, and even the e-mail server 23, may all optionally be deployed on the same physical computer.

Figure 2 is a block diagram illustrating an exemplary embodiment, according to the present invention, of the knowledge site management server 27. The server 27 is shown to include a socket front-end 40 to facilitate communication with the web server 20 for administrative requests, a request handler 44, a knowledge gathering system 28, a knowledge converter 24, and a variety of specialized controller modules 45A - 45C. The request handler 44, upon receiving a request from the web server 20 via the interface application 34 and socket front-end 40, starts a session to process the request such as, for example, a request by an authorized systems administrator to configure the behavior of the knowledge gathering system 28.

The knowledge gathering system 28 is shown in **Figure 2** to include an extraction controller 47, a mail system interface 42, and a term extractor 46 including confidence logic 45. The extraction controller 47 commands the mail system interface 42 to retrieve messages submitted by the e-mail client

extensions 19 to the KS mailbox 25 on the e-mail server 23 for the purpose of extraction and processing. The extraction controller 47 can request this continuously or periodically on a scheduled basis, so that messages can be processed at a convenient time when computing resources are lightly
5 loaded, for example, overnight. The mail system interface 42 retrieves e-mail messages from the e-mail server 23 using the Simple Mail Transfer Protocol (SMTP), Post Office Protocol 3 (POP3), or Internet Message Access Protocol 4 (IMAP4) protocols. The mail system interface 42 propagates electronic documents directly to a term extractor 46, including confidence
10 logic 45, that operates to convert electronic documents into per-user knowledge profiles that are stored in a knowledge repository 50. The term extractor 46 may include any commercially available term extraction engine (such as "NPTOOL" from LingSoft Inc. of Helsinki, Finland, or "Themes" from Software Scientific) that analyzes the electronic document, recognizes
15 noun phrases in the document, and converts such phrases to a canonical form for subsequent use by the confidence logic 45 as candidate terms in a knowledge profile.

The term extractor 46 performs a variety of the steps when parsing and decoding an electronic document, such as interpreting any special
20 attributes or settings encoded into the header of the message of the e-mail client 18, resolving the e-mail addresses of recipients against either the built-in user database or an external user database, preprocessing the electronic document, extracting noun-phrases from the text as candidates for

knowledge terms, processing these knowledge terms, and storing summary information about the document and extraction process in the databases 56A and 56B. The term extractor 46 further detects and strips out non-original texts, attachments and in some cases the entire electronic document based on the document not meeting predetermined minimum criteria. Further details regarding the exact procedures implemented by the term extractor 46 will be provided below. Once the term extractor 46 has extracted the knowledge terms, the knowledge repository 50 is updated. Specifically, new terms are added, and repetitions of known terms are used to update the knowledge repository 50.

The knowledge repository 50 is defined by a hierarchical structure of classes. The objects of these classes represent the knowledge information that includes, inter alia, user profiles (including knowledge profiles) and organizational structure, and are stored in two databases: the user database 56A and the repository database 56B. The repository database 56B contains profile and repository information and can use one of a number of commercial relational database management systems that support the Open DataBase Connectivity (ODBC) interface standard. A database interface 54 provides a logical database-independent class API to access the physical databases and to shield the complete server codes from accessing database native API so that the server process can use any relational database management system (RDMS). Because the repository database 56A is open to inspection by systems administrators, and may be hosted on an existing

corporate system, special measures may be taken to enhance the privacy of information in the repository database 56B; for example, the repository database 56B contains no actual user names or e-mail addresses, but instead may use encrypted codes to represent users in a manner that is meaningful
5 only in combination with the user database. The user database 56A is a small commercial RDBMS embedded into the knowledge repository 50 in such a way that it cannot be accessed except through the interfaces offered by the system 10. The user database 56A contains encrypted identifying codes that allow the names of actual users to be associated with e-mail
10 addresses, login IDs, passwords, and profile and repository information in the repository database.

A lexicon controller 45C is responsible for building tables of associated terms. Terms are considered "associated" with each other to the extent that they tend to co-occur in close proximity within the documents of
15 multiple users. The lexicon controller 45C manages the background process of data mining that is used to discover associations between terms and record those in special association tables within the repository database 56B.

A profile controller 45B is a module that may optionally be included within the knowledge site management server 27, and manages a queue of
20 pending, compute-intensive operations associated with updating profiles. Since the algorithm for the confidence level value calculation of a term (embodied in the confidence logic 45) depends on the total number of documents profiled, the confidence level value for each and every term in a

user's profile is technically obsolete when any document is profiled. The profile controller 45B manages the "recalculation" of profiles. The actual operation is performed within the knowledge access server 26, which has a knowledge repository 50 interface.

5 A case controller 45A keeps track of open cases and initiates notifications to users concerning their status. A "case" is a pending request from one user to another, as will be detailed below. For example, if a user requests an expert in a certain field via a client browser client 16, the knowledge access server 26 matches the term against both the public and
10 private portions of all user profiles. If a high confidence, but private, match is found, the system cannot reveal the identity of the matched person to the inquirer and must therefore open a "case". The case places a notification in the profile "home" page of the target user and/or transmits an e-mail message with a link back to that page. The target user may then (via a
15 browser):

1. See the identity of the inquirer and the basis of the match.
2. See comments added by the inquirer.
3. Deny the request, at which point the case is closed.
4. Put a block on any further matches from that person or based on
20 that term.
5. Go into the profile and edit the term responsible for the match.
6. Indicate that the case is accepted and provide authorization to reveal the identity of the target to the inquirer.

From the perspective of the inquirer, private matches are initially returned with a match strength only and do not reveal the name of the person or document matched. The user can then initiate cases for any or all of these private matches, based on how urgently the information is needed, how good the matches were, and whether the public matches are sufficient. Each case gets an expiration date set by the inquirer and notification options regarding how the inquirer wants to be told about the disposition of the case. Open cases are summarized in the Web area for the inquirer, along with the date and query that generated the return values. If the target denies a case, that status is communicated to the user. The user has no option to send e-mail or otherwise further identify that person. If the target accepts the case, the identity of the target is communicated to the user by updating the case record and the case is closed. Case history retention options are a site administration option.

Figure 3 is a block diagram illustrating the components that constitute the knowledge access server 26. The knowledge access server 26 is shown to include a socket front-end 40 to facilitate communication with the web server interface application 34. The knowledge access server 26 further includes a request handler 44, a term extractor 46, a knowledge repository 50 and a database interface 54 that function in a manner similar to that described above with reference to the knowledge gathering system 28. The term extractor 46 includes comparison logic 51, the functioning of which will be described below. The knowledge access server 26 functions

primarily as an interface between knowledge users and the knowledge repository 50. It provides services to the web server interface application 34, which implements a number of user interfaces as described above for interacting with the knowledge repository 50.

5 **Figure 4** is a block diagram illustrating the components that constitute the knowledge converter 24. The knowledge converter 24 is shown to include a term extractor 46 that is fed from an array of format converters 60. The knowledge converter 24 is able to access the knowledge repository 50, and to import data from other knowledge systems, or export
10 knowledge to other knowledge systems, via each of the format converters 60.

Returning to **Figure 1**, the knowledge access server 26 implements the interface to the knowledge repository 50 and the knowledge site management server 27 is shown to access the knowledge repository 50 via
15 the knowledge access server 26. **Figures 3 and 4** illustrate data for the knowledge repository 50 as residing in databases 56A and 56B. The databases 56A and 56B are built on a general database interface 54 and provide persistent storage for the core system classes referred to above. In one exemplary embodiment of the present invention, the user database and
20 the repository databases are implemented utilizing the Microsoft SQL server, developed by Microsoft Corp. of Redmond Washington, to provide default storage management services for the system. However, programming may be done at a more general level to allow for substitution

of other production class relational database management systems, such as those developed by Sybase, Oracle or Informix.

CLIENT SIDE ARCHITECTURE

Figure 5 is a diagrammatic representation of a client, according to an exemplary embodiment of the present invention, in the form of an e-mail client 18. It will be appreciated that the e-mail client 18 may be any commercially available e-mail client, such as a Microsoft Exchange, Outlook Express, Outlook 97/98 or Lotus Notes client. The e-mail client 18 includes modifications or additions, in the form of the extensions 19, to the standard e-mail client to provide additional functionality. Specifically, according to an exemplary embodiment of the present invention, three subsystems are included within the e-mail client extensions 19, namely a user interface 80, a profiling system 82, and an addressing system 84.

The profiling system 82 implements properties on an originated message, as well as menu and property sheet extensions at global and message levels for users to set and manipulate these new properties. More specifically, profiling system 82 provides a user with a number of additional options that determine how a message 85 propagated from the e-mail client 18 to the knowledge repository 50 will be processed and handled for the purposes of knowledge management. A number of the provided options are global, while others apply on a per-message basis. For example, according to one exemplary embodiment, the following per-message options (or flags) may be set by a user to define the properties of an e-mail message:

A number of global message options may also be made available to a user for selection. For example, an e-mail address (i.e., the KS mailbox 25 or the e-mail server 23) for the knowledge server 22 may be enabled, so that the e-mail message is propagated to the server 22.

Actual implementation and presentation of the above per-message and global options to the user may be done by the addition of a companion application or set of software modules which interact with API's provided by e-mail clients, or modules which modify the e-mail client itself, which are available during message composition. If the user activates the Ignore flag 86, the profiling system 82 will not make any modifications to the message and no copy of the message will be sent to the knowledge gathering system 28 via the KS mailbox 25. Otherwise, per-message options, once obtained from the user, are encoded. Subsequently, when the user chooses to send

the message 85 using the appropriate control on the particular e-mail client 18, the e-mail address of the knowledge gathering server is appended to the blind copy list for the message. The profiling system 82 encrypts and encodes the following information into the message header, for transmission 5 to and decoding by the knowledge gathering system 28, in accordance with Internet specification RFC 1522:

1. The list of e-mail addresses in the "to:" and "cc:" lists;
2. Per-message options as appropriate; and
3. For those recipients suggested by the addressing system 84 (see 10 below), a short list of topic identifiers including the primary topics found within the message and the primary topics found within the user profile that formed a basis of a match.
4. Security information to validate the message as authentic.

When the message 85 is sent over the normal e-mail transport, the following 15 events occur:

1. Recipients on the "to:" and "cc:" lists will receive a normal message with an extra header containing the encoded and encrypted options. This header is normally not displayed by systems that read e-mail and can be ignored by recipients;
- 20 2. The recipients will not be aware that the knowledge gathering system has received a blind copy of the message; and

3. If the sender chooses to archive a copy of the message 85, the e-mail address of the knowledge gathering system 28 will be retained in the "bcc" field as a reminder that the message was sent to the knowledge gathering server.

5 Further details concerning the addressing system 86 will be discussed below.

THE REPOSITORY

Figure 6 is a block diagram illustrating the structure of the repository 50, according to one exemplary embodiment of the present invention, as constructed from data contained in the repository database 56B, and the user database 56A. The repository 50 is shown to include a number of tables, as constructed by a relational database management system (RDBMS). Specifically, the repository 50 includes a user table 90, a term table 100, a document table 106, a user-term table 112, a term-document table 120 and a user-document table 130. The user table 90 stores information regarding users for whom knowledge profiles may be constructed, and includes an identifier column 92, including unique keys for each entry or record within the table 90. A name column 94 includes respective names for users for whom knowledge profiles are maintained within the repository 50. A department column 96 contains a description of departments within an organization to which each of the users may be assigned, and an e-mail column 98 stores respective e-mail addresses for the users. It will be

appreciated that the illustrated columns are merely exemplary, and a number of other columns, storing further information regarding users, may be included within the user table 90.

The term table 100 maintains a respective record for each term that is identified by the term extractor 46 within an electronic document, and that is included within the repository 50. The term table 100 is shown to include an identifier column 102, that stores a unique key for each term record, and a term column 104 within which the actual extracted and identified terms are stored. Again, a number of further columns may optionally be included within the term table 100. The document table 106 maintains a respective record for each document that is processed by the term extractor 46 for the purposes of extracting terms therefrom. The document table 106 is shown to include an identifier column 108, that stores a unique key for each document record, and a document name column 110, that stores an appropriate name for each document analyzed by the term extractor 46.

The user-term table 112 links terms to users, and includes at least two columns, namely a user identifier column 114, storing keys identifying users, and a term identifier column 116, storing keys identifying terms. The user-term table 112 provides a many-to-many mapping of users to terms. For example, multiple users may be associated with a single term, and a single user may similarly be associated with multiple terms. The table 112 further includes a confidence level column 118, which stores respective confidence level values, calculated in the manner described below, for each user-term

5 The term-document table 120 links terms to documents, and provides
a record of which terms occurred within which document. Specifically, the
term-document table 120 includes a term identifier column 122, storing keys
for terms, and a document identifier column 124, storing keys for
documents. The table 120 further includes an adjusted count column 126,
10 which stores values indicative of the number of occurrences of a term within
a document, adjusted in the manner described below. For example, the first
record within the table 120 records that the term "network" occurred within
the document "e-mail 1" 2.8 times, according to the adjusted count.

The user-document table 130 links documents to users, and includes
15 at least two columns, namely a user identifier column 132, storing keys
identifying users, and a document identifier column 134, storing keys
identifying various documents. For example, the first record within the
exemplary user-document table 130 indicates that the user "Joe" is associated
with the document "e-mail 1". This association may be based upon the user
20 being the author or recipient of the relevant document.

IDENTIFICATION OF KNOWLEDGE TERMS AND THE CALCULATION
OF ASSOCIATED CONFIDENCE LEVEL VALUES

5 **Figure 7** is a flow chart illustrating a method 140, according to an exemplary embodiment of the present invention, of constructing a user knowledge profile. **Figure 7** illustrates broad steps that are described in further detail with reference to subsequent flow charts and drawings. The method 140 commences at step 142, and proceeds to decision box 144, wherein a determination is made as to whether an electronic document, for example in the form of an e-mail propagated from an e-mail client 18, is indicated as being a private document. This determination may be made at 10 the e-mail client 18 itself, at the e-mail server 23, or even within the knowledge site management server 27. This determination may furthermore be made by ascertaining whether the Ignore flag 86, incorporated within an e-mail message 85, is set to indicate the e-mail message 85 as private. As discussed above, the Ignore flag 86 may be set at a 15 users discretion utilizing the profiling system 82, accessed via the user interface 80 within the extensions 19 to the e-mail client 18. In the event that the electronic document is determined to be private, the method 140 terminates at step 146, and no further processing of the electronic document occurs. Alternatively, the method 140 proceeds to step 148, where 20 confidence level values are assigned to various terms within the electronic document. At step 150, a user knowledge profile is constructed utilizing the

terms within the electronic document to which confidence level values were assigned at step 148. The method 140 then terminates at step 146.

Figure 8 is a flow chart illustrating a high-level method 148, according to an exemplary embodiment of the present invention, by which terms may be extracted from an electronic document, and by which confidence level values may be assigned such terms. The method 148 comprises two primary operations, namely a term extraction operation indicated at 152, and a confidence level value assigning operation, indicated at a 154. The method 148 implements one methodology by which the step 148 shown in **Figure 7** may be accomplished. The method 148 begins at step 160, and then proceeds to step 162, where an electronic document, such as for example an e-mail, a database query, a HTML document and or a database query, is received at the knowledge site management server 27 via the mail system interface 42. For the purposes of explanation, the present example will assume that an e-mail message, addressed to the KS mailbox 25, is received at the knowledge site management server 27 via the mail system interface 42, from the e-mail server 23. At step 164, terms and associated information are extracted from the electronic document. Specifically, the e-mail message is propagated from the mail system interface 42 to the term extractor 46, which then extracts terms in the form of, for example, grammar terms, noun phrases, word collections or single words from the e-mail message. The term extractor 46 may further parse a header portion of the e-mail to extract information therefrom that is required for the

maintenance of both the repository and user databases 56B and 56A. For example, the term extractor 46 will identify the date of transmission of the e-mail, and all addressees. The term extractor 46 will additionally determine further information regarding the electronic document and terms therein.

- 5 For example, the term extractor 46 will determine the total number of words comprising the electronic document, the density of recurring words within the document, the length of each term (i.e., the number of words that constitute the term), the part of speech that each word within the document constitutes, and a word type (e.g., whether the word is a lexicon term). To
- 10 this end, the term extractor 46 is shown in **Figure 2** to have access to a database 49 of lexicon terms, which may identify both universal lexicon terms and environment lexicon terms specific to an environment within which the knowledge site management server 27 is being employed. For example, within a manufacturing environment, the collection of
- 15 environment lexicon terms will clearly differ from the lexicon terms within an accounting environment.

- Following the actual term extraction, a first relevancy indicator in the form of an adjusted count value is calculated for each term within the context of the electronic document at step 168. At step 170, a second
- 20 relevancy indicator in the form of a confidence level is calculated for each term within the context of multiple electronic documents associated with a particular user. Further details regarding steps 168 and 170 are provided below. The method 148 then terminates at step 172.

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Figure 9A is a flow chart illustrating a method 154, according to an exemplary embodiment of the present invention, of determining a confidence level for a term extracted from an electronic document.

Following the commencement step 180, a term and associated information is received at the confidence logic 45, included within the term extractor 46. While the confidence logic 45 is shown to be embodied in the term extractor 46 in Figure 2, it will be appreciated that the confidence logic 45 may exist independently and separately of the term extractor 46. In one embodiment, the associated information includes the following parameters:

1. A count value indicating the number of occurrences of the term within a single electronic document under consideration;
2. A density value, expressed as a percentage, indicating the number of occurrences of the term relative to the total number of terms within the electronic document;
3. A length of value indicating the total number of words included within the relevant term;
4. A Part of Speech indication indicating the parts of speech that words included within the term comprise (e.g., nouns, verbs, adjectives, or adverbs); and

5. A Type indication indicating whether the term comprises a universal lexicon term, an environment lexicon term, or is of unknown grammatical structure.

At step 184, a "binding strength", indicative of how closely the term is coupled to the electronic document under consideration, is determined. While this determination may be made in any number of ways, **Figure 10** shows an exemplary term-document binding table 200, utilizing which a class may be assigned to each of the extracted terms. Specifically, the term-document binding table 200 is shown to include three columns, namely a "number of occurrences" column 202, a density column 204, and an assigned class column 206. A term having a density value of greater than four percent, for example, is identified as falling in the "A" class, a term having a density of between two and four percent is identified as falling in the "B" class, a term having a density of between one and two percent is identified as falling in the "C" class, while a term having a density of between 0.5 and one percent is identified as falling in the "D" class. For the terms having a density of above 0.5 percent, the density value is utilized to assign a class. For terms which have a density value less than 0.5 percent, the count value is utilized for this purpose. Specifically, a term having a count value of greater than 3 is assigned to the "E" class, and a term having a count value of between 1 and 3 is assigned to the "F" class. Accordingly, the assigned class is indicative of the "binding strength" with which the term is associated with or coupled to the electronic document under consideration.

At step 186, a characteristic (or qualitative) indicator in the form of a term weight value is determined, based on characteristics qualities of the term such as those represented by the Type and Part of Speech indications discussed above. While this determination may again be made in any number of ways, **Figure 11** shows an exemplary weight table 210, utilizing which a weight value may be assigned to each of the extracted terms. Specifically, the weight table 210 is shown to include four columns, namely a weight column 212, a type column 214, a length column 216 and a Part of Speech column 218. By identifying an appropriate combination of type, length and Part of Speech indications, an appropriate term weight value is assigned to each term. In the type column 214, a type "P" indication identifies an environment lexicon term, a type "L" indication identifies a universal lexicon term, and a type "U" indication identifies a term of unknown grammatical structure for a given length. The entries within the length column 216 indicate the number of words included within the term. The entries within the Part of Speech column 218 indicate the parts of speech that the words within a term comprise. The "A" indication identifies the adjectives, the "V" indication identifies a verb, the "N" indication identifies a noun, and the "X" indication identifies an unknown part of speech. By mapping a specific term to an appropriate entry within the weight table 210, an appropriate term weight value, as indicated in the weight column 212, may be assigned to the term.

At step 188, a relevancy quantitative indicator in the form of an adjusted count value for each term, is calculated, this adjusted count value being derived from the binding strength and term weight values calculated at steps 184 and 186. While this determination may again be made in any number of ways, **Figure 12** shows an exemplary occurrence factor table 220, utilizing which an adjusted count value for the relevant term may be determined. The occurrence factor table 220 is shown to include values for various binding strength/term weight value combinations. The adjusted count value is indicative of the importance or relevance of term within a single, given document, and does not consider the importance or relevance of the term in view of any occurrences of the term in other electronic documents that may be associated with a particular user.

At step 190, a determination is made as to whether any adjusted count values exists for the relevant term as a result of the occurrence of the term in previously received and analyzed documents. If so, the adjusted count values for occurrences of the term in all such previous documents are summed.

At step 192, an initial confidence level values for the term is then determined based on the summed adjusted counts and the term weight, as determined above with reference to the weight table 210 shown in **Figure 11**. To this end, **Figure 13** illustrates a confidence level table 230, which includes various initial confidence level values for various summed adjusted count/weight value combinations that may have been determined for a

term. For example, a term having a summed adjusted count of 0.125, and a weight value of 300, may be allocated an initial confidence level value of 11.5. Following the determination of an initial confidence level value, confidence level values for various terms may be grouped into "classes", which still retain cardinal meaning, but which standardize the confidence levels into a finite number of "confidence bands". **Figure 14** illustrates a modified table 240, derived from the confidence level table 230, wherein the initial confidence levels assigned are either rounded up or rounded down to certain values. By grouping into classes by rounding, applications (like e-mail addressing), can make use of the classes without specific knowledge/dependence on the numerical values. These can then be tuned without impact to the applications. The modified confidence level values included within the table 240 may have significance in a number of applications. For example, users may request that terms with a confidence level of greater than 1000 automatically be published in a "public" portion of their user knowledge profile. Further, e-mail addressees for a particular e-mail may be suggested based on a match between a term in the e-mail and a term within the user knowledge profile having a confidence level value of greater than, merely for example, 600.

The method 154 then terminates at step 194.

In a further embodiment of the present invention, the method 154, illustrated in **Figure 9A**, may be supplemented by a number of additional steps 195, as illustrated in **Figure 9B**, by which a "document weight" value is

assigned to a document based on addressee information associated with the document. The document weight value may be utilized in any one of the steps 182-192 illustrated in **Figure 9A**, for example, as a multiplying factor to calculate a confidence level value for a term. In one exemplary embodiment, the binding strength value, as determined at step 184, may be multiplied by the document weight value. In another exemplary embodiment, the term weight value, as determined at step 186, may be multiplied by the document weight value.

The document weight value may be calculated by the confidence logic 45 within the term extractor 46. Referring to **Figure 9B**, at step 196, the confidence logic 45 identifies the actual addressee information. To this end, the term extractor 46 may include a header parser (not shown) that extracts and identifies the relevant addressee information. At step 197, the confidence logic 45 then accesses a directory structure that may be maintained by an external communication program for the purposes of determining the level of seniority within an organization of the addressees associated with the document. In one exemplary embodiment of the invention, the directory structure may be a Lightweight Directory Access Protocol (LDAP) directory maintained by a groupware server, such as Microsoft Exchange or Lotus Notes. At step 198, a cumulative seniority level for the various addressees is determined by summing seniority values for each of the addressees. At step 199, the summed seniority value is scaled to generate the document weight value. In this embodiment, the cumulative

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or summed seniority level of the various addressees comprises an "average" seniority value that is used for the purpose of calculating the document weight term. Alternatively, instead of summing in the seniority values at step 198, a "peak" seniority value (i.e., a seniority value based on the seniority level of the most senior addressee) may be identified and scaled at step 199 to generate the document weight value.

In alternative embodiments, the addressee information may be utilized in a different manner to generate a document weight value. Specifically, a document weight value may be calculated based on the number of addressees, with a higher number of addressees resulting in a greater document weight value. Similarly, a document weight value may be calculated based on the number of addressees who are included within a specific organizational boundary (e.g., a specific department or division). For example, an e-mail message addressed primarily to an executive group may be assigned a greater document weight value than an e-mail message addressed primarily to a group of subordinates. Further, the document weight value may also be calculated using any combination of the above discussed addressee information characteristics. For example, the document weight value could be calculated using both addressee seniority and addressee number information.

CONSTRUCTION OF A USER KNOWLEDGE PROFILE

Figure 15A is a flow chart illustrating a method 250, according to one exemplary embodiment of the present invention, of constructing a user

profile that includes first and second portions that may conveniently be identified as "private" and "public" portions. Specifically, unrestricted access to the "public" portion of the user knowledge profile may be provided to other users, while restricted access to the "private" portion may be

5 facilitated. For example, unrestricted access may encompass allowing a user to review details concerning a user knowledge profile, and the target user, responsive to a specific request and without specific authorization from the target user. Restricted access, on the other hand, may require specific authorization by the target user for the provision of information concerning

10 the user knowledge profile, and the target user, in response to a specific request. The method 250 commences at step 252, and then proceeds to step 254, where a determination is made regarding the confidence level value assigned to a term, for example using the method 154 described above with reference to **Figure 9A**. Having determined the confidence level value, the

15 method 250 proceeds to step 256, where a threshold value is determined. The threshold value may either be a default value, or a user specified value, and is utilized to categorize the relevant term. For example, users may set the threshold through the browser interface as a fundamental configuration for their profile. If set low, the user profile will be aggressively published to

20 the public side. If set high, only terms with a high level of confidence will be published. Users can also elect to bypass the threshold publishing concept altogether, manually reviewing each term that crosses the threshold (via the notification manager) and then deciding whether to publish. At decision

box 258, a determination is made as to whether the confidence level value for the term is less than the threshold value. If so, this may be indicative of a degree of uncertainty regarding the term as being an accurate descriptor of a user's knowledge. Accordingly, at step 260, the relevant term is then stored in the "private" portion of the user knowledge profile. Alternatively, should the confidence level value be greater than the threshold value, this may be indicative of a greater degree of certainty regarding the term as an accurate descriptor of a user's knowledge, and the relevant term is then stored in the "public" portion of the user's knowledge profile at step 262. The method then terminates at step 264.

Figure 16A shows an exemplary user-term table 112, constructed according to the method 250 illustrated in **Figure 15A**. Specifically, the table 112 is shown to include a first user knowledge profile 270 and a second user knowledge profile 280. The first user knowledge profile 270 is shown to include a "public" portion 272, and a "private" portion 274, the terms within the "private" portion 274 having an assigned confidence level value (as indicated in the confidence level column 118) below a threshold value of 300. The second user knowledge profile 280 similarly has a "public" portion 282 and a "private" portion 284.

The exemplary user-term table 112 shown in **Figure 16A** comprises an embodiment of the table 112 in which the public and private portions are determined dynamically with reference to a confidence level value assigned to a particular user-term pairing. **Figure 16B** illustrates an alternative

embodiment of the user-term table 112 that includes a "private flag" column 119, within which a user-term pairing may be identified as being either public or private, and accordingly part of either the public or private portion of a specific user profile. While the state of a private flag associated with a particular user-term pairing may be determined exclusively by the confidence level associated with the pairing, in an alternative embodiment of the invention, the state of this flag may be set by other mechanisms. For example, as described in further detail below with reference to **Figure 17E**, a user may be provided with the opportunity manually to modify the private or public designation of a term (i.e., move a term between the public and private portions of a user knowledge profile). A user may be provided with an opportunity to modify the private or public designation of a term in response to a number of events. Merely for example, a user may be prompted to designate a term as public in response to a "hit" upon a term in the private portion during a query process, such as during an "expert-lookup" query or during an "addressee-lookup" query.

When storing the term in the user knowledge profile at either steps 260 or 262, the allocation of the term to the appropriate portion may be made by setting a flag, associated with the term, in the "private flag" column 119 within the user-term table 112, as illustrated in **Figure 16B**. For example, a logical "1" entry within the "private flag" column 119 may identify the associated term as being in the "private" portion of the relevant user knowledge profile, while a logical "0" entry within the "private flag" column

119 may identify the associated term as being in the "public" portion of the relevant user knowledge profile.

Figure 15B illustrates an exemplary method 260/262, according to one embodiment of the present invention, of storing a term in either a public or private portion of a user knowledge profile. Specifically, a respective
5 term is added to a notification list at step 1264, following the determination made at decision box 258, as illustrated in **Figure 15A**. At decision box 1268, a determination is made as to whether a predetermined number of terms have been accumulated within the notification list, or whether a
10 predetermined time period has passed. If these conditions are not met, the method waits for additional terms to be added to the notification list, or for further time to pass, at step 1266, before looping back to the step 1264. On the other hand, should a condition within the decision box 1268 have been met, the method proceeds to step 1270, where the notification list, that
15 includes a predetermined number of terms that are to be added to the user knowledge profile, is displayed to a user. The notification list may be provided to the user in the form of an e-mail message, or alternatively the user may be directed to a web site (e.g., by a URL included within e-mail message) that displays the notification list. In yet a further embodiment, the
20 notification list may be displayed on a web or intranet page that is frequently accessed by the user, such as a home page. At step 1272, the user then selects terms that are to be included in the public portion of the user knowledge profile. For example, the user may select appropriate buttons

displayed alongside the various terms within the notification list to identify terms for either the public or private portions of the user knowledge profile. At step 1274, private flags, such as those contained within the "private flag" column 119 of the user-term table 112 as shown in **Figure 16B**, may be set to

5 a logical zero "0" to indicate that the terms selected by the user are included within the public portion. Similarly, private flags may be set to a logical one "1" to indicate terms that were not selected by the user for inclusion within the public portion are by default included within the private portion. It will of course be appreciated that the user may, at step 1272, select terms to be

10 included within the private portion, in which case unselected terms will by default be included within the public portion. The method then ends at step 1280.

The above described method is advantageous in that a user is not required to remember routinely to update his or her user profile, but is

15 instead periodically notified of terms that are candidates for inclusion within his or her user knowledge profile. Upon notification, the user may then select terms for inclusion within the respective public and private portions of the user knowledge profile. As such, the method may be viewed as a "push" model for profile maintenance.

METHOD OF ACCESSING A USER KNOWLEDGE PROFILE

While the above method 250 is described as being executed at the time of construction of a user knowledge profile, it will readily be appreciated that the method may be dynamically implemented as required and in response to a specific query, with a view to determining whether at least a portion of a user knowledge profile should be published, or remain private responsive to the relevant query. To this end, **Figure 17A** shows a flow chart illustrating a method 300, according to one exemplary embodiment of the present invention, of facilitating access to a user knowledge profile. The method 300 commences at step 302, and then proceeds to step 304, where a threshold value is determined. At step 306, a document term within an electronic document generated by a user (hereinafter referred to as a "query" user) is identified. Step 306 is performed by the term extractor 46 responsive, for example, to the receipt of an e-mail from the mail system interface 42 within the knowledge gathering system 28. At step 308, comparison logic 51 within the term extractor 46 identifies a knowledge term within the repository 50 corresponding to the document term identified at step 306. The comparison logic 51 also determines a confidence level value for the identified knowledge term. At decision box 310, the comparison logic 51 makes a determination as to whether the confidence level value for the knowledge term identified at step 308 is less than the threshold value identified at step 304. If not (that is the confidence

level value is greater than the threshold value) then a public profile process is executed at step 312. Alternatively, a private profile process is executed at step 314 if the confidence level value falls below the threshold value. The method 300 then terminates at step 316.

5 **Figure 17B** shows a flowchart illustrating an alternative method 301, according to an exemplary embodiment of the present invention, of facilitating access to a user knowledge profile. The method 301 commences at step 302, and then proceeds to step 306, where a document term within an electronic document generated by a user (i.e., the "query" user) is identified.

10 The term extractor 46 performs step 306 responsive, for example, to the receipt of an e-mail message from the mail system interface 42 within the knowledge gathering system 28. At step 308, the comparison logic 51 within the term extractor 46 identifies a knowledge term within the knowledge repository 50 corresponding to the document term identified at step 306. At

15 decision box 311, the comparison logic 51 then makes a determination as to whether a "private" flag for the knowledge term is set to indicate the relevant knowledge term as being either in the public or the private portion of a user knowledge profile. Specifically, the comparison logic 51 may examine the content of an entry in the private flag column 112 of a user-term

20 table for a specific user-term pairing of which the knowledge term is a component. If the "private" flag for the knowledge term is set, thus indicating the knowledge term as being in the private portion of a user knowledge profile, the private profile process is executed at step 314.

Alternatively, the public profile process is executed at step 312. The method 301 then terminates at step 316.

Figure 17C shows a flow chart detailing a method 312, according to an exemplary embodiment of the present invention, of performing the public profile process mentioned in **Figures 17A** and **17B**. The method 312 commences at step 320, and user information, the knowledge term corresponding to the document term, and the confidence level value assigned to the relevant knowledge term are retrieved at steps 322, 324, and 326. This information is then displayed to the query user at step 328, whereafter the method 312 terminates at step 330.

Figure 17D shows a flow chart detailing a method 314, according to an exemplary embodiment of the present invention, of performing the private profile process mentioned in **Figures 17A** and **17B**. The method 314 commences at step 340, and proceeds to step 342, where a user (herein after referred to as the "target" user) who is the owner of the knowledge profile against which the hit occurred is notified of the query hit. This notification may occur in any one of a number of ways, such as for example via an e-mail message. Such an e-mail message may further include a URL pointing to a network location at which further information regarding the query hit, as well as a number of target user options, may be presented. At step 346, the reasons for the query hit are displayed to the target user. Such reasons may include, for example, matching, or similar, document and knowledge terms utilizing which the hit was identified and the confidence level value

associated with the knowledge term. These reasons may furthermore be presented within the e-mail propagated at step 342, or at the network location identified by the URL embedded within the e-mail. At step 348, the target user then exercises a number of target user options. For example, the target user may elect to reject the hit, accept the hit, and/or modify his or her user knowledge profile in light of the hit. Specifically, the target user may wish to "move" certain terms between the public and private portions of the user knowledge profile. Further, the user may optionally delete certain terms from the user knowledge profile in order to avoid any further occurrences of hits on such terms. These target user options may furthermore be exercised via a HTML document at the network location identified by the URL. At decision box 350, a determination is made as to whether the user elected to modify the user knowledge profile. If so, a profile modification process, which is described below with reference to **Figure 17E**, is executed at step 352. Otherwise, a determination is made at decision box 354 as to whether the target user rejected the hit. If so, the hit is de-registered at step 356. Alternatively, if the target user accepted the hit, the public profile process described above with reference to **Figure 17C** is executed at step 358. The method 314 then terminates at step 360.

Figure 17E is a flowchart illustrating a method 352, according to an exemplary embodiment of the present invention, for implementing the profile modification process illustrated at step 352 in **Figure 17D**. The method 352 commences at step 362, and then proceeds to display step 364,

where the target user is prompted to (1) move a term, on which a "hit" has occurred, between the private and public portions of his or her user knowledge profile, or to (2) delete the relevant term from his or her user knowledge profile. Specifically, the target user may be presented with a user dialog, a HTML-enriched e-mail message, or a Web page, listing the various terms upon which hits occurred as a result of an inquiry, besides which appropriate buttons are displayed that allow the user to designate the term either to be included in the public or private portion of his or her user knowledge profile, or that allow the user to mark the relevant term for deletion from the user knowledge profile. At input step 366, the target user makes selections regarding the terms in the matter described above. At decision box 368, a determination is made as to whether the user selected terms for transfer between the public and private portions of the user profile, or for inclusion within the user profile. If so, the method proceeds to step 370, wherein the appropriate terms are designated as being either public or private, in accordance with the user selection, by setting appropriate values in the "private flag" column 119 within the user-term table, as illustrated in **Figure 16B**. Thereafter, the method proceeds to decision box 372, wherein a determination is made as to whether the user has elected to delete any of the terms presented at step 364. If so, the relevant terms are deleted from the user knowledge profile at step 374. The method is then terminated at step 378.

The methodologies described above with reference to **Figures 15** through **17E** are advantageous in that, where the confidence level of a term falls below a predetermined threshold, the owner of the user knowledge profile may elect to be involved in the process of determining whether a query hit is accurate or inaccurate. The owner of the user knowledge profile is also afforded the opportunity to update and modify his or her knowledge profile as and when needed. Further, the owner of the user knowledge profile is only engaged in the process for hits below a predetermined certainty level and on a public portion of the knowledge profile. Matches between document terms and knowledge terms in the public portion are automatically processed, without any manual involvement.

METHOD FOR ADDRESSING AN ELECTRONIC DOCUMENT FOR TRANSMISSION OVER A NETWORK

Returning now briefly to **Figure 5**, the addressing system 84 within the e-mail client extensions 19 operates independently of the profiling system 82 to suggest potential recipients for an e-mail message based on the content thereof. This may conveniently be termed "control-directed" mail. The user interface 80 within the e-mail client extensions 19 may pop-up a window when the system determines such suggestion is possible, based on the length of a draft message being sent, or may present a command button labeled "Suggest Recipients". This button is user selectable to initiate a sequence of operations whereby the author of the e-mail is presented with a list of potential recipients who may be interested in receiving the e-mail

based on predetermined criteria, such as a match between the content of the e-mail and a user profile, or a commonality with a confirmed addressee.

Figure 18A is a flow chart illustrating a method 400, according to an exemplary embodiment of the present invention, of addressing an electronic document, such as an e-mail, for transmission over a network, such as the Internet or an Intranet. The method 400 commences at step 402, and then proceeds to step 401, where a determination is made as to whether the body of the draft message exceeds a predetermined length (or number of words). If so, content of the electronic document (e.g., an e-mail message body) is transmitted to the knowledge access server 26 via the web server 20 at step 404. Specifically, a socket connection is open between the e-mail client 18 and the web server 20, and the content of the message body, which may still be in draft form, is transmitted using the Hypertext Transfer Protocol (HTTP) via the web server 20 to the knowledge access server 26. At step 406, the knowledge access server 26 processes the message body, as will be described in further detail below. At step 408, the knowledge access server 26 transmits a potential or proposed recipient list and associated information to the addressing system 84 of the e-mail client 18. Specifically, the information transmitted to the e-mail client 18 may include the following:

1. A list of user names, as listed within column 94 of the user table 90, as well as corresponding e-mail addresses, as listed within the column 98 of the user table 90;

2. A list of term identifiers, as listed in column 116 of the user-term table 112, that were located within the "public" portion of a user knowledge profile that formed the basis for a match between document terms within the message body and knowledge terms within the user knowledge profile; and

5 3. A "matching metric" for each user included in the list of user names (1). Each "matching metric" comprises the sum of the confidence level values, each multiplied by the weighted occurrences of the term within the message body, for the terms identified by the list of term identifiers (2) and associated with the relevant user. This "matching metric" is indicative of
10 the strength of the recommendation by the knowledge access server 26 that the relevant user (i.e., potential recipient) be included within the list of confirmed addressees.

At step 410, the author of the electronic document is presented with a
15 list of potential recipients by the e-mail client 18, and specifically by the addressing system 84 via a user dialog 440 as shown in **Figure 18D**. **Figure 18D** groups matching levels into matching classes each characterized by a visual representation (icon).

The user dialog 440 shown in **Figure 18D** presents the list of potential
20 recipients in a "potential recipients" scrolling window 442, wherein the names of potential recipients are grouped into levels or ranked classes according to the strength of the matching metric. An icon is also associated with each user name, and provides an indication of the strength of the

recommendation of the relevant potential recipients. Merely for example, a fully shaded circle may indicate a high recommendation, with various degrees of "blackening" or darkening of a circle indicating lesser degrees of recommendation. A "rejection" icon may be associated with an actual
5 recipient, and an example of such a "rejection" icon is indicated at 441. The "rejection" icon indicates a negative recommendation on an actual recipient supplied by the author of the message, and may be provided in response to a user manually modifying his or her profile to designate certain terms therein as generating such a "rejection" status for a recipient against which a
10 hit occurs.

The user dialog 440 also presents a list of actual (or confirmed) recipients in three windows, namely a "to:" window 442, a "cc:" window 444 and a "bcc:" window 446. An inquiring user may move recipients between the potential recipients list and the actual recipients lists utilizing the "Add"
15 and "Remove" buttons indicated at 450. The user dialog 440 also includes an array of "select" buttons 452, utilizing which a user can determine the recommendation group to be displayed within the scrolling window 442. The user dialog 440 finally also includes "Explained Match" and "More" buttons 454 and 456, the purposes of which is elaborated upon below. As
20 shown in **Figure 18D**, the author user may select an "Explain" function for any of the proposed recipients utilizing the "Explain Match" button 454. If it is determined at decision box 412 that this "Explain" function has been selected, the method 400 branches to step 414, as illustrated in **Figure 18B**.

Specifically, at step 414, the addressing system 84 propagates a further "Explain" query to the knowledge access server 26 utilizing HTTP, and opens a browser window within which to display the results of the query. At step 416, the knowledge access server 26 retrieves the terms (i.e., the knowledge terms) that constituted the basis for the match, as well as associated confidence level values. This information is retrieved from the public portion of the relevant user knowledge profile in the knowledge repository 50. At step 418, the information retrieved at step 416 is propagated to the client 18 from the knowledge access server 26 via the web server 20. The information is then displayed within the browser window opened by the e-mail client 18 at step 414. Accordingly, the author user is thus able to ascertain the reason for the proposal of a potential recipient by the addressing system 84, and to make a more informed decision as to whether the proposed recipient should be included within the actual recipients (confirmed addressee) list.

The user also has the option of initiating a "More" function by selecting the "More" button 456 on the user dialog 440, this function serving to provide the user with additional proposed recipients. Accordingly, a determination is made at step 422 as to whether the "More" function has been selected by the author user. If so, the method 400 branches to step 424 as shown in **Figure 18C**, where the client 18 propagates a "More" request to the knowledge access server 20 in the same manner as the "Explain" query was propagated to the knowledge access server at step 414. At step 426, the

knowledge access server 26 identifies further potential recipients, for example, by using a threshold value for the "matching metric" that is lower than a threshold value utilized as a cutoff during the initial information retrieval operation performed at steps 406 and 408. At step 428, the

5 knowledge access server 26 then transmits the list of further potential recipients, and associated information, to the e-mail client 18. At step 430, the list of additional potential recipients is presented to the author user for selection in descending order according to the "matching metric" associated with each of the potential recipients.

10 At step 432, the user then adds at his or her option, or deletes selected potential or "rejected" recipients to the list of actual recipients identified in "to:", "cc:" or "bcc:" lists of the e-mail, thus altering the status of the potential recipients to actual recipients. At step 434, the e-mail message is then transmitted to the confirmed addressees.

15 If the user profile includes a "rejection" status on a term (something a user can do through manual modification of the profile), then a special symbol, such as that indicated 441 in **Figure 18D**, may be returned indicating a negative recommendation on a recipient supplied by the author of the message.

20 The exemplary method 400 discussed above is advantageous in that the knowledge access server 26 automatically provides the author user with a list of potential addressees, based on a matching between document terms

identified within the message body of an e-mail and knowledge terms included within user profiles.

CASE CONTROL

Figure 19 is a flow chart illustrating a method 500, according to one exemplary embodiment of the present invention, of managing user authorization to publish, or permit access to, a user knowledge profile. The method 500 is executed by the case controller 45A that tracks open "cases" and initiates notification to users concerning the status of such cases. For the purposes of the present specification, the term "case" may be taken to refer to a user authorization process for publication of, or access to, a user knowledge profile. The method 500 commences at step 502, and then proceeds to step 504, where a match is detected with a private portion of a user knowledge profile. At step 504, the case controller 45A then opens a case, and notifies the target user at step 506 concerning the "hits" or matches between a document (or query) term and a knowledge term in a knowledge user profile. This notification may be by way of an e-mail message, or by way of publication of information on a Web page accessed by the user. At step 508, the case controller 45A determines whether an expiration date, by which the target user is required to respond to the hit, has been reached or in fact passed. If the expiration date has passed, the case controller 45A closes the case and the method 500 terminates. Alternatively, a determination is made at decision box 510 as to whether the target user has responded to the notification by authorizing publication of, or access to, his

a confidence level value utilizing the method illustrated in **Figure 9**, aged terms (i.e., terms which have not appeared in recent documents) may be attributed a low confidence level value even though they may be highly descriptive of a specialization or knowledge of a user. The situation may occur where a user is particularly active with respect to a particular topic for a short period of time, and then re-focuses attention on another topic. Over time, the methodology illustrated in **Figure 9** may too rapidly lower the confidence level values associated with terms indicating user knowledge.

Referring to **Figure 20**, there is illustrated the exemplary method 550 of assigning a confidence value to a term. The method 550 commences at step 552, whereafter an initial confidence memory value (as distinct from a confidence level value) is assigned a zero (0) value. At step 556, a confidence level value for a term is calculated utilizing, for example, the method 154 illustrates in **Figure 9**. However, this confidence level value is only calculated for occurrences of the relevant term within a particular time or document window. For example, in summing the adjusted count values at step 190 within the method 154, the adjusted count values for only documents received within a predetermined time (e.g., the past 30 days), or only for a predetermined number of documents (e.g., the last 30 documents) are utilized to calculate the summed adjusted count value. It will be appreciated that by discarding documents, which occurred before the time or document window, the effect on the confidence level values for aged

terms by the absence of such aged terms within recent documents may be reduced.

At decision box 558, a determination is then made as to whether a newly calculated confidence level value for a term is greater than a previously recorded confidence memory value, or alternatively greater than a predetermined site-wide or system-wide threshold value. If the confidence level value is determined to be greater than the confidence memory value (or the threshold value), the confidence memory value is then made equal to the confidence level value by overwriting the previous confidence memory value with the newly calculated confidence level value. In this way, it is ensured that the confidence level value does not exceed the confidence memory value.

Figure 22 is an exemplary user-term table 112, according to one embodiment of the present invention, that is shown to include a confidence level column 118, a confidence memory value column 121, and a time stamp column 123. The table 122 records a confidence level value and a confidence memory value for each user-term pairing within the table 112, and it is to this table that the confidence level values and the confidence memory values are written by the method 550. The time stamp column 123 records a date and time stamp value indicative of the date and time at which the corresponding confidence memory value was last updated. This value will accordingly be updated upon the overwriting of the confidence memory value at step 560.

Should the confidence level value not exceed the confidence memory value or the threshold value, as determined at decision box 558, the method 550 then proceeds to decision box 562, where a further determination is made as to whether another time or document window, associated with a step of decaying the confidence memory value, has expired. If not, the confidence memory value is left unchanged at step 564. Alternatively, if the time or document window associated with the decay step has expired, the confidence memory value is decayed by a predetermined value or percentage at step 566. For example, the confidence memory value may be decayed by five (5) percent per month. The time stamp value may be utilized to determine the window associated with the decay step. The time stamp value associated with the decayed confidence memory value is also updated at step 566. The method 550 then terminates at step 568.

Figure 21 is a flowchart illustrating an exemplary method 570, according to one embodiment of the present invention, of determining or identifying a confidence value (e.g., either a confidence level value or a confidence memory value) for a term. The method 570 may be executed in performance of any of the steps described in the preceding flow charts that require the identification of a confidence level value for a term in response to a hit on the term by a document term (e.g., in an electronic document or other query). The method 570 commences at step 572, and proceeds to step 574, where a confidence level value for a term within a user profile is identified. For example, the confidence level value may be identified within

(e.g., a mouse), a disk drive unit 614, a signal generation device 616 (e.g., a speaker) and a network interface device 618. The disk drive unit 614 accommodates a machine-readable medium 615 on which software 620 embodying any one of the methods described above is stored. The software 620 is shown to also reside, completely or at least partially, within the main memory 603 and/or within the processor 602. The software 620 may furthermore be transmitted or received by the network interface device 618. For the purposes of the present specification, the term "machine-readable medium" shall be taken to include any medium that is capable of storing or encoding a sequence of instructions for execution by a machine, such as the computer system 600, and that causes the machine to performing the methods of the present invention. The term "machine-readable medium" shall be taken to include, but not be limited to, solid-state memories, optical and magnetic disks, and carrier wave signals.

15

EXEMPLARY USER INTERFACES

A number of further exemplary user interfaces will now be described. One embodiment of the invention proposes facilitating access by a user to the knowledge server 22 via three access features that are provided via (1) an e-mail client 18 (e.g., the extension 19), (2) a system tray, and (3) a "send to" feature presented within user interfaces of an operating system (e.g., the Windows® family of operating systems). User interface functionality for each of these features will be briefly discussed below.

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In one embodiment of the present invention, the user interface functionality is provided via two applications, namely a (1) desktop application, which may comprise the extension 19 discussed above with reference to **Figure 1**, and (2) a portal that is supported on the server side

5 14. Dealing firstly with the desktop application, this application may be seamlessly integrated into an operating system environment (e.g., a Windows® environment) and interact with an e-mail client 18 and a user interface for the relevant operating system. The desktop application may operate, in the manner described below, to analyze content, automatically
10 assist in the building of user-controlled profiles, locate people, assist the user to solve problems, and direct communications to others based on the content of such communications. The desktop application may integrate into an e-mail client 18, such as a Microsoft Outlook or a Lotus Notes client, as well as Windows ® 98 or NT to provide "send to" and system tray facilities.

15 The portal constitutes an application that may be accessible from any browser client 16, and provides user access to a number of server-side 14 provided functionality. In one embodiment, the portal application may facilitate navigation and browsing to locate expertise in an enterprise environment.

20

E-MAIL FUNCTIONALITY - CONTENT-DIRECTED COMMUNICATIONS

While the user interfaces discussed below are directed to the addressing and direction of e-mail communications, the teachings of the

present invention may be provided to a wider range of communications, including instant messaging, text chat, voice communications (e.g., telephone or voice-mail communications), or facsimile communications.

Figure 24A illustrates an exemplary interface 700 presented by the e-mail client 18, (e.g., the Lotus Notes e-mail client), as supplemented by the desktop application in the form of the extension 19. The interface 700 is shown to include a "send to my KnowledgeMail Profile" check box 702 that is user-selectable to cause a subject e-mail to be submitted to the mail box 25, so that the contents thereof may be utilized to supplement a profile of the relevant user. It should be noted that identified terms extracted from the e-mail communication will be added to the private portion of a knowledge profile, in the manner described above.

The interface 700 is also shown to present a search icon 704, a sweep icon 706 and a configuration icon 708 in conjunction with each e-mail composed utilizing the e-mail client 18. The search icon 704 is user-selectable to invoke features of the desktop application to facilitate the addressing (or direction) of the e-mail based on the content thereof to recipients having the most interest in, or need for, such content.

Responsive to user-selection of the search icon 704, a filter criteria dialog box 710, an example of which is shown in **Figure 24B**, is then presented to the user (i.e., the sender) to enable the user to optionally provide criteria, beyond the content of the communication, to be applied in identifying suggested recipients of the communication.

Having specified the filter criteria, the content of the communication is transmitted to the knowledge server 22, in the manner described above with reference to **Figure 18A**, responsive to which the knowledge access server 26 transmits a potential recipient list, and associated information, to the e-mail client 18, or the desktop application. This information may be communicated, for example, as a XML document.

The list of potential recipients is then displayed to the sending user in the manner describe above with reference to **Figure 18D**, each potential recipient being listed in association with an icon that provides an indication of the strength of the recommendation of the potential recipient based on the strength of a match between the content of the communication and the content of a descriptive profile maintained by the knowledge server 22 for the relevant potential recipient.

Referring specifically to **Figure 24C**, an alternative embodiment of the user dialog 440, shown in **Figure 18D**, is illustrated. Specifically, the dialog block 712, illustrated in **Figure 24C**, in addition to providing a list of potential (or suggested) recipients within a "suggested recipients" scrolling window 714, presents a "selected terms" window 716. Within the "selected terms" window 716, the desktop application, utilizing information received from the knowledge server 22, presents to the sending user an indication of the correspondence between the contents of the communication (e.g., the e-mail) and one or more descriptive profiles for proposed recipients identified within the "suggested recipients" window 714. Specifically, in the exemplary

embodiment illustrated in **Figure 24C**, terms within a draft e-mail that have been identified as corresponding to terms within the descriptive profiles of the suggested recipients are visually differentiated (e.g., highlighted or underlined) from the rest of the content of the e-mail. In this way, the sending user is conveniently able to identify terms within the draft e-mail that have resulted in the suggestion of the recipients shown in the window 714. It will be appreciated that the portions of the e-mail that mail corresponded to descriptive profiles could be communicated in any number of ways. For example, a separate and distinct listing of such terms may be presented in a distinct window.

Figure 24D illustrates further exemplary functionality provided by the dialog box 712, and specifically the "selected terms" window 716. User selection of a particular term within the "selected terms" window 716 is shown to cause an identification to the sending user of those suggested recipients for which a correspondence (e.g., a match) occurred between the user-selected term and a published (or public) term in the respective descriptive profiles of the suggested recipients. For example, as illustrated in **Figure 24D**, user selection of the term "private profiles" causes the suggested recipients "Brian", "Mark", and "Jim" to be visually differentiated within the "suggested recipients" window 714, thus indicating that a correspondence was detected between the term "private profiles" and published terms within the knowledge profiles of those suggested recipients.

This feature is particularly useful in that a sending user, by selection of a term of particular relevance, is able to identify suggested recipients suggested by the knowledge server 22 on the basis of that particularly relevant term. The names within the "suggested recipients" window 714 may, it will be appreciated, be visually differentiated or otherwise identified in any number of ways.

Figure 24E illustrates a feature whereby user-selection of a name within the "suggested recipients" window 714 causes one or more terms within the "selected terms" window 716 to be identified (e.g., by visual differentiation) so that the sending user can conveniently determine which content of the communication (e.g., the e-mail) corresponds to published (or public) terms within the descriptive profile of the identified user. For example, the user selection of the name "Joe" 718 within the window 714 may cause the term "KnowledgeMail" 720 within the window 716 to be highlighted. In this way, the sending user can conveniently select or deselect suggested recipients as actual recipients on the basis of terms within the communication based on the relevance or interest to the sending user.

Figure 24F illustrates an exemplary selection window 722, utilizing which a sending user may conveniently select suggested recipients as actual recipients by the marking of check boxes associated with the name of each suggested recipient. The selection window 722 also communicates the

strength of the match between the published descriptive profile of each of the suggested recipients and the content of the communication.

"SEND-TO" FUNCTIONALITY

5 As described above, in addition to electronic mail messages, the present invention contemplates that any communication, or other forms of electronic documents may be utilized in the construction of a knowledge profile. To this end, the above-mentioned desktop application may modify the user interface of an operating system (e.g., any one of the Windows®
10 family of operating systems) to conveniently incorporate "send to" functionality therein whereby electronic documents accessible via a computer system can be submitted to the knowledge server 22 for inclusion within a knowledge profile. To this end, **Figures 25A** and **25B** illustrate exemplary features which a user interface presented by an operating system,
15 may provide to facilitate the submission of such electronic documents.

Figure 25A illustrates an exemplary cascade of menus 730 and 732, whereby a user is able to select a file (e.g., any electronic document) identified within the user interface of the operating system and, for example by left clicking utilizing a mouse, to invoke the window 730, which presents
20 a "send to" option, which in turn invokes the menu 732. The desktop application, in one exemplary embodiment, modifies the menu 732 to include a "My KnowledgeMail Profile" option 734, which is user-selectable to cause the selected electronic file to be communicated to the knowledge

server 22 for utilization in supplementing the knowledge profile of the relevant user.

Figure 25B illustrates an exemplary profiler dialog box 736, utilizing which a user may select multiple files for both submission to the knowledge server 22.

SYSTEM TRAY - SEARCH AND KNOWLEDGE SWEEP FUNCTIONALITY

While browsing the Internet, studying a particular document, or in the course of everyday operations, a particular user may wish to locate a further entity (e.g., a person) within an enterprise or corporate structure having knowledge regarding a particular subject. To this end, the present invention proposes, in one embodiment, a web-based portal, enabled via one or more web servers 20 that provide an interface to a knowledge server 22. The portal may, within an enterprise environment, facilitate access to descriptive profiles of other members of an enterprise, and facilitate permission-based interactions between such members of the enterprise.

Figure 26A illustrates that a system tray icon 740 may be presented within the system tray of the Windows® user interface, user selection of the icon 740 causing the display, as illustrated in **Figure 26B**, of a menu 742 including an "Open KnowledgeMail Portal" option 744. A number of other options, some of which are discussed above, relating to the knowledge server 22 are also presented.

User selection of the option 744 in **Figure 26B** invokes the browser client 16, and to direct the browser client 16 to issue a request to the web server 20 (e.g., a HTTP request embodying a URL) for access to the portal interfaces generated by the web server 20. **Figure 26C** illustrates an
5 exemplary portal interface 750, in the form of a markup language document, which is shown to present user-selectable home, search, KnowledgeSweep, Personal Profile and Preferences options.

Figure 26B illustrates an exemplary search interface 752, generated responsive to user selection of the search option in the portal interface 750.
10 The search interface 752 is shown to include a search term input field 754 via which a user may attempt to locate descriptive profiles including published terms corresponding to entered keywords. The search interface also presents the user with the options of browsing through profiles.

Figure 26E illustrates an exemplary search results interface 756 that
15 displays the results of a keyword search. Specifically within the interface 756, the names of users against which hits occurred are displayed in a ranked order based on the strength of the hit (e.g., based on a correspondence of the search and published terms within respective descriptive profiles), along with visual indications of the strength of the hits.
20 Further, descriptive profile terms for each of the located users are also displayed to enable a searching user conveniently to discern the expertise of the located user reflected in published terms of the relevant descriptive profile. User selection of a hypertext-linked name within the search result

interface 756 invokes a published profile interface 758, an exemplary embodiment of which is shown in **Figure 26F**, which includes further information regarding published terms and information concerning the relevant user as reflected within the descriptive profile.

5 The search result interface 756 is also shown to include a "KnowledgeSweep" button 760 that is user-selectable to invoke a "sweep", utilizing the inputted search keywords, against unpublished (or private) terms included within the descriptive profiles of users. Specifically, a "sweep" is distinguished from a search in that, for a sweep, a correspondence
10 between search terms and unpublished (or private) terms within a descriptive profile is detected. Responsive to detection of such a correspondence, the relevant user for which the correspondence was detected is queried for permission to publish his or her details to a querying user. As described above, this request for permission to publish details of
15 the located user to the querying user is presented with information concerning the relevant query to the located user. This enables the located user to assess whether a affirmative or negative response is appropriate, and also to allow the located user the opportunity to modify his or her profile to avoid similar "sweep hits" in the future.

20 **Figure 26G** illustrates an exemplary sweep interface 762, generated responsive to user-selection of the "KnowledgeSweep" button 760 in the search results interface 756. The sweep interface 762 may also, it will be

appreciated, be generated by user-selection of the "KnowledgeSweep" option presented in the header of all portal interfaces.

Referring specifically to **Figure 26G**, the sweep interface 762 is shown to include a title input field 764 and a comment input field 766 into which
 5 the querying user may input information to assist a located user assess the appropriateness of responding to a "sweep hit".

The querying user may also specify that the sweep terminate after receiving a predetermined number of responses, or after a predetermined time period (e.g., after receiving 10 responses or after a time period of 10
 10 days). The querying user may also specify a minimum "match strength" for a "sweep hit" to occur by convenient user-selection of a graphical presentation of a range of matching strengths.

Figure 26H illustrates an exemplary portal interface 750 of a user against which a "sweep hit" has occurred. Specifically, as indicated at 770,
 15 an advisory message is communicated to the user regarding the "sweep" hit. Further, a user may be alerted by e-mail regarding such a hit.

Figure 26I illustrates an exemplary sweep response interface 772, communicating details of a sweep hit to a located user, and providing a choice of response options. Specifically, a user against which a sweep hit has
 20 occurred may, for example, choose to make his or her details known to the querying user, or to ignore the request. Further, the located user is presented with the option of referring the querying user to a further user.

Thus, a method and system to address a communication for transmission over a network have been described. Although the present invention has been described with reference to specific exemplary embodiments, it will be evident that various modifications and changes may
5 be made to these embodiments without departing from the broader spirit and scope of the invention. Accordingly, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense.

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CLAIMS

What is claimed is:

- 1 1. A method of addressing a communication for transmission
2 over a network, the method including:
3
4 accessing a descriptive profile of a potential recipient of the
5 communication;
6
7 identifying the potential recipient as the suggested recipient
8 based on a correspondence between content of the
9 communication and content of the descriptive profile of the
10 potential recipient; and
11
12 presenting the suggested recipient to a sender of the
13 communication for selection as a confirmed recipient, the
14 suggested recipient being presented in conjunction with an
15 indication of the correspondence between the content of the
16 communication and the content of the descriptive profile of the
17 potential recipient.

- 1 2. The method of claim 1 wherein the indication of the
2 correspondence includes an identification of a portion of the content of the

3 communication that corresponds to the content of the descriptive profile of
4 the potential recipient.

1 3. The method of claim 2 wherein the communication comprises
2 an electronic document, and the identification comprises identification of
3 content of the electronic document that corresponds to the content of the
4 descriptive profile.

1 4. The method of claim of 3 wherein the identification of the
2 content of the electronic document includes identifying textual terms within
3 the electronic document.

1 5. The method of claim 4 wherein the identification of the textual
2 terms includes identifying the textual terms within the context of the
3 electronic document.

1 6. The method of claim 5 wherein the identification of the textual
2 terms includes visually differentiating terms of the electronic document,
3 which correspond to terms of the descriptive profile, within the context of
4 the electronic document.

1 7. The method of claim 1 including, responsive to sender
2 identification of the suggested recipient, identifying content of the

3 communication corresponding to the descriptive profile of the suggested
4 recipient identified by the sender.

1 8. The method of claim 1 including accessing a plurality of
2 descriptive profiles of a plurality of potential recipients of the
3 communication, identifying a plurality of the potential recipients as
4 suggested recipients, and presenting the plurality of suggested recipients to
5 the sender, and wherein, responsive to sender identification of a portion of
6 the content of the communication, identifying to the sender at least one of
7 the plurality of potential recipients based on a correspondence between the
8 sender-identified portion of the communication and content of a descriptive
9 profile for the at least one of the plurality of potential recipients.

1 9. The method of claim 8 wherein the sender-identified portion of
2 the content of the communication includes a plurality of terms of an
3 electronic document.

1 10. The method of claim 1 including presenting an indication of a
2 strength of the correspondence between the content of the communication
3 and the content of the descriptive profile for the potential recipient.

1 11. The method of claim 10 including presenting a plurality of
2 suggested recipients to the sender together with a respective indication of a

3 strength of a correspondence for each of the plurality of suggested recipients
4 between the content of the communication and a respective descriptive
5 profile for each of the plurality of suggested recipients.

1 12. The method of claim 11 including ranking the plurality of
2 suggested recipients according to the respective strengths of the
3 correspondences between the content of the communication and the
4 descriptive profiles for the plurality of the suggested recipients.

1 13. The method of claim 1 including prompting the sender for a
2 filter criteria prior to accessing the descriptive profile, and applying the filter
3 criteria in the identification of the potential recipient.

1 14. A system to address a communication for transmission over a
2 network, the system including:

3
4 an access server to access a descriptive profile of a potential
5 recipient of the communication and to identify the potential
6 recipient as the suggested recipient based on a correspondence
7 between content of the communication and content of the
8 descriptive profile of the potential recipient; and
9

10 a communications server to present the suggested recipient to
 11 a sender of the communication in conjunction with an
 12 indication of the correspondence between the content of the
 13 communication and the content of the descriptive profile of the
 14 potential recipient.

1 15. The system of claim 14 wherein the communication server is to
 2 identify a portion of the content of the communication that corresponds to
 3 the content of the descriptive profile of the potential recipient.

1 16. The system of claim 15 wherein the communication comprises
 2 an electronic document, and the communications server is to identify the
 3 content of the electronic document that corresponds to the content of the
 4 descriptive profile.

1 17. The system of claim of 16 wherein the communications server
 2 is to identify textual terms within the electronic document.

1 18. The system of claim 17 wherein the communications server is
 2 to identify the textual terms within the context of the electronic document.

1 19. The system of claim 18 wherein the communication server is to
 2 visually differentiate textual terms of the electronic document that

3 correspond to terms of the descriptive profile within the context of the
4 electronic document.

1 20. The system of claim 14 wherein the communications server,
2 responsive to sender identification of the suggested recipient, is to identify
3 to the sender content of the communication corresponding to the descriptive
4 profile of the suggested recipient identified by the sender.

1 21. The system of claim 14 wherein the access server is to access a
2 plurality of descriptive profiles of a plurality of potential recipients of the
3 communication and to identify a plurality of the potential recipients as
4 suggested recipients, and the communications server is to present the
5 plurality of suggested recipients to the sender, and wherein the
6 communications server, responsive to sender identification of a portion of
7 the content of the communication, is to identify to the sender at least one of
8 the plurality of potential recipients based on a correspondence between the
9 sender-identified portion of the communication and content of a descriptive
10 profile for the at least one of the plurality of potential recipients.

1 22. The system of claim 21 wherein the sender-identified portion
2 of the content of the communication includes a plurality of terms of an
3 electronic document.

1 23. The system of claim 14 wherein the communications server is
2 to present an indication of a strength of the correspondence between the
3 content of the communication and the content of the descriptive profile for
4 the potential recipient.

1 24. The system of claim 23 wherein the communications server is
2 to present a plurality of suggested recipients to the sender together with a
3 respective indication of a strength of a correspondence for each of the
4 plurality of suggested recipients between the content of the communication
5 and a respective descriptive profile for each of the plurality of suggested
6 recipients.

1 25. The system of claim 24 wherein the communications server is
2 to rank the plurality of suggested recipients according to the respective
3 strengths of the correspondences between the content of the communication
4 and the descriptive profiles for the plurality of the suggested recipients.

1 26. The system of claim 14 wherein the communications server is
2 to prompt the sender for a filter criteria prior to accessing the descriptive
3 profile, and the access server is to apply the filter criteria in the identification
4 of the potential recipient.

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1 27. A system for addressing a communication for transmission
2 over a network, the system including:
3
4 first means for accessing a descriptive profile of a potential
5 recipient of the communication and for identifying the
6 potential recipient as the suggested recipient based on a
7 correspondence between content of the communication and
8 content of the descriptive profile of the potential recipient; and
9
10 second means for presenting the suggested recipient to a
11 sender of the communication in conjunction with an indication
12 of the correspondence between the content of the
13 communication and the content of the descriptive profile of the
14 potential recipient.

1 28. A machine-readable medium storing a sequence of instructions
2 that, when executed by a machine, cause the machine to:
3
4 access a descriptive profile of a potential recipient of the
5 communication;
6
7 identify the potential recipient as the suggested recipient based
8 on a correspondence between content of the communication

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9 and content of the descriptive profile of the potential recipient;
10 and
11
12 present the suggested recipient to a sender of the
13 communication for selection as a confirmed recipient, the
14 suggested recipient being presented in conjunction with an
15 indication of the correspondence between the content of the
16 communication and the content of the descriptive profile of the
17 potential recipient.
18

ABSTRACT OF THE DISCLOSURE

A method of addressing a communication, such as an e-mail, for transmission over a network. A knowledge server accesses a descriptive profile for each of a number of potential recipients of the communication. A subset of the potential recipients are identified as suggested recipients based on detected correspondences between the content of the communication and the contents of the respective descriptive profiles for the potential recipients. The subset of suggested recipients is then presented to the sender of the communication, in conjunction with an indication of the correspondence between the content of the communication and the contents of the respective descriptive profiles. The indication of the correspondence may, for example, include highlighting terms within

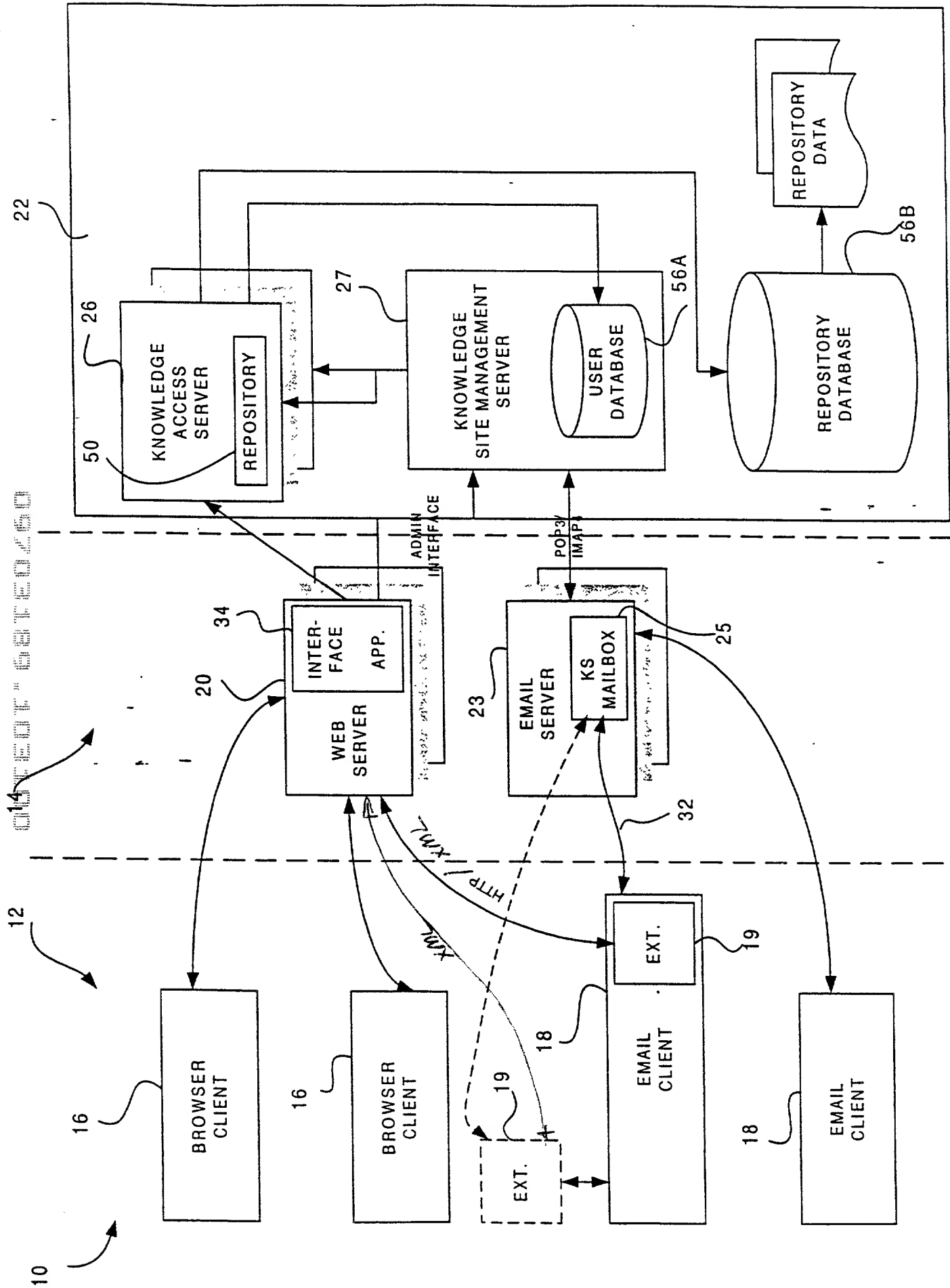
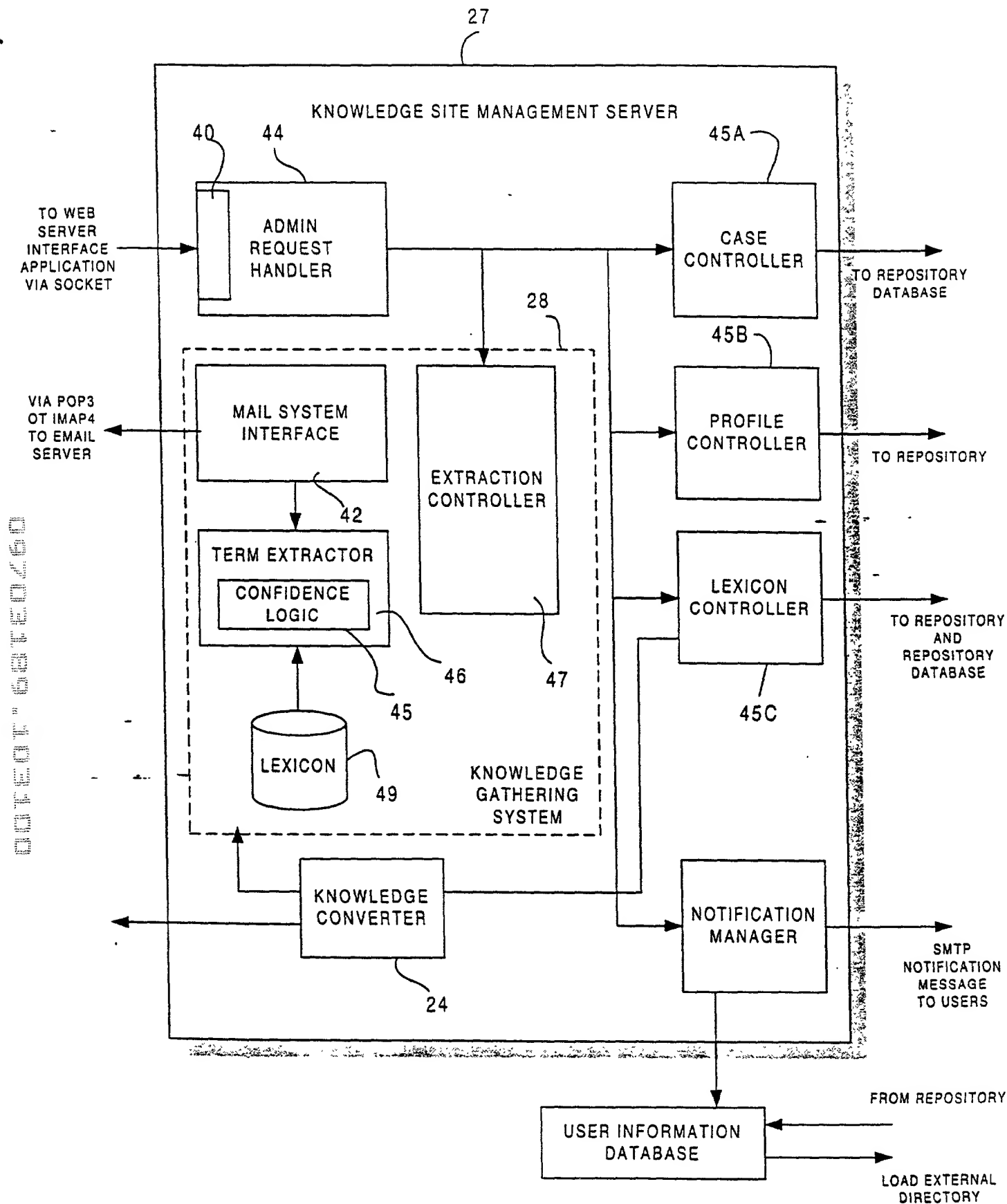


FIGURE 1



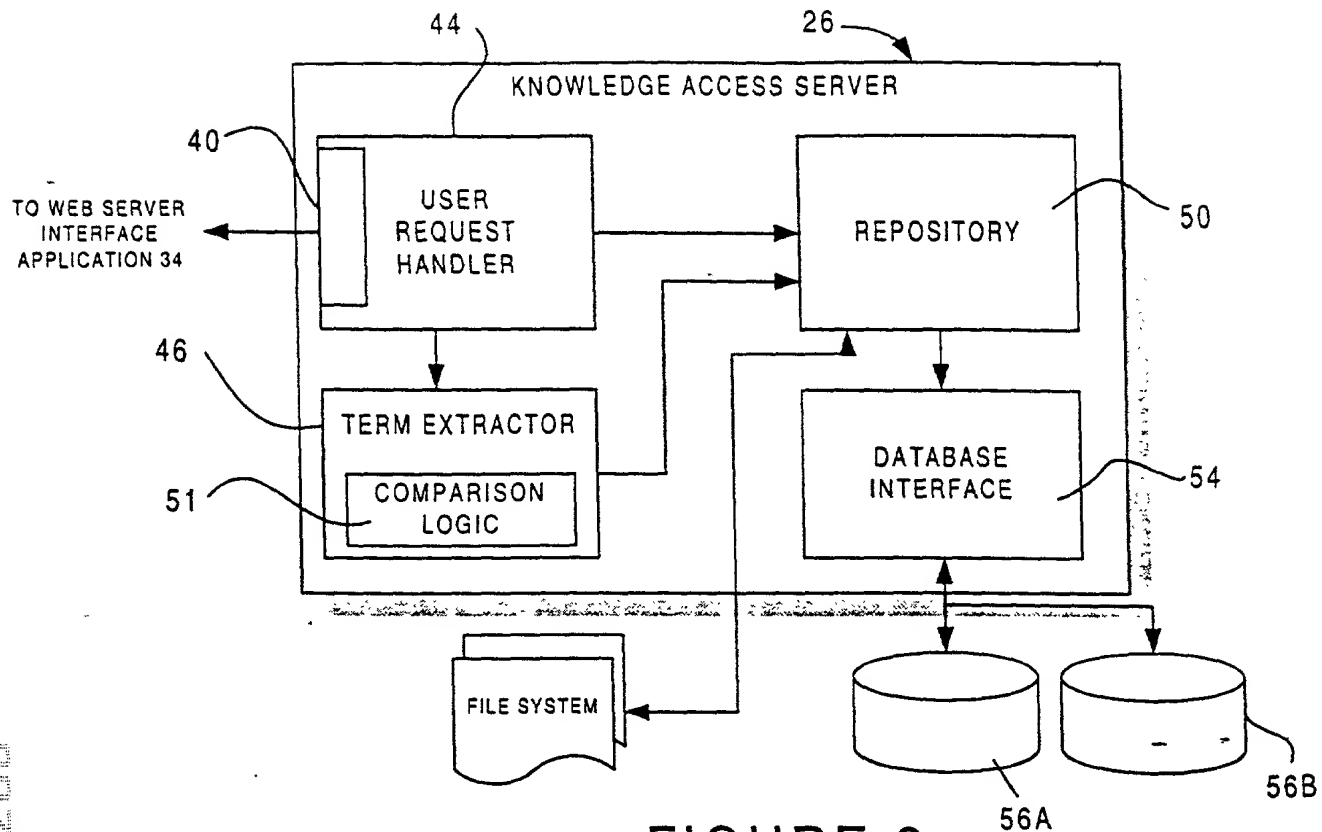


FIGURE 3

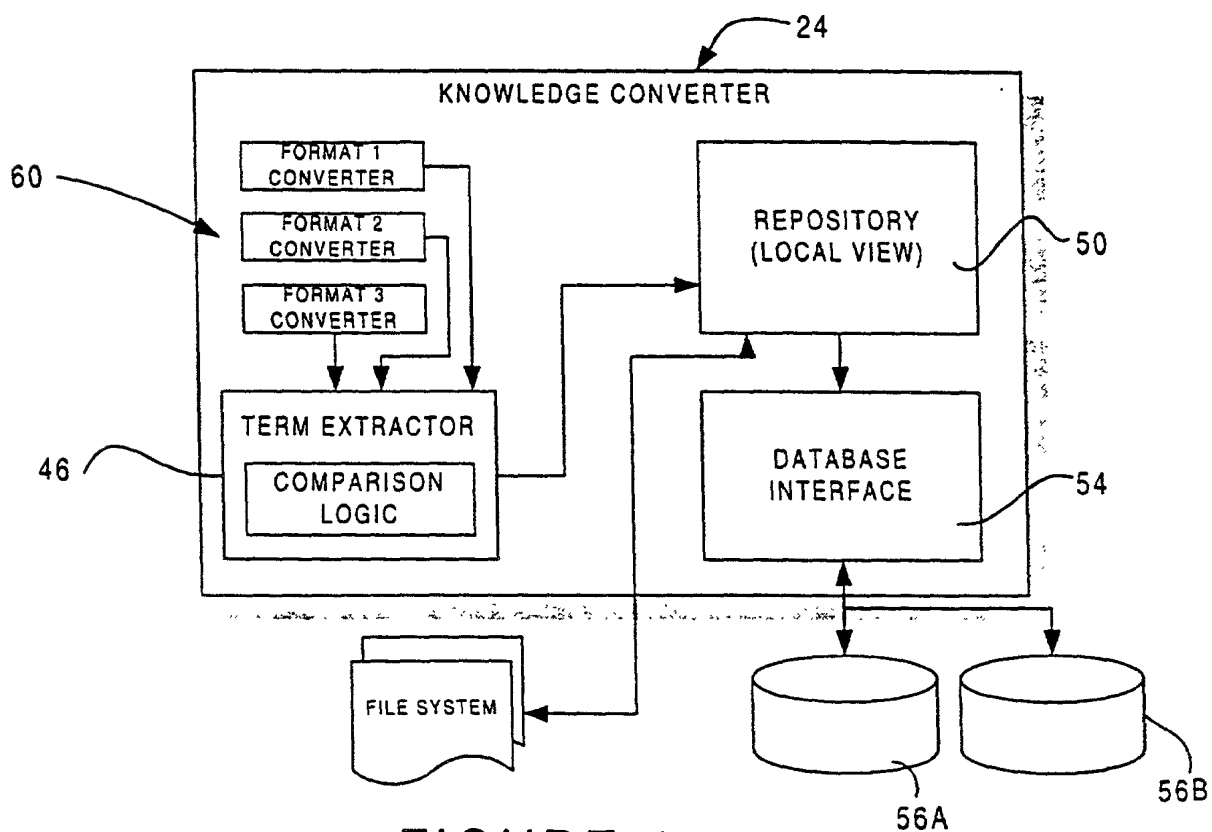


FIGURE 4

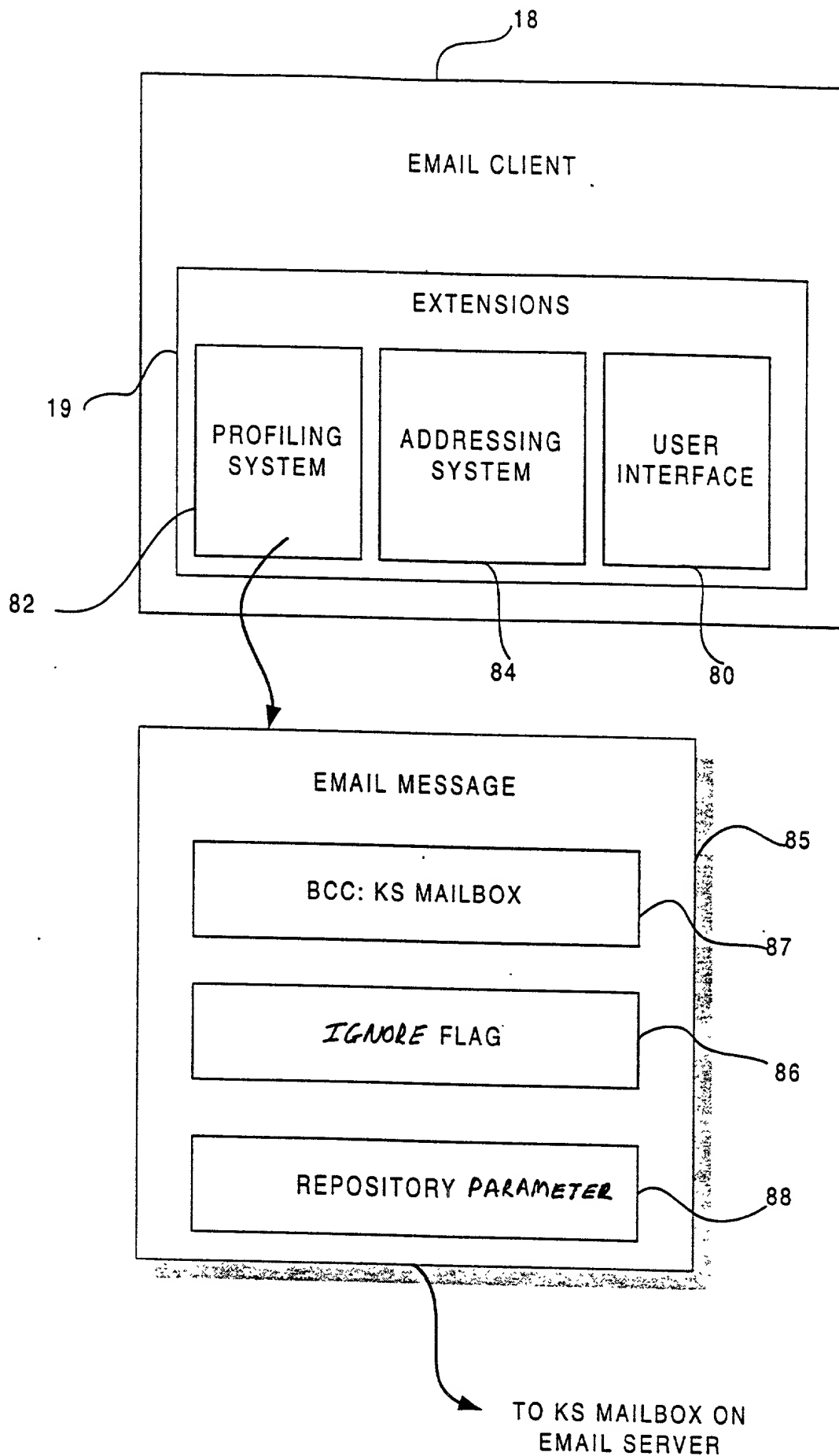


FIGURE 5

90

USER TABLE

USER ID	NAME	DEPART	EMAIL
1	JOE	A	JOE@CO.NET
2	MIKE	B	MIKE@CO.NET
3	JOHN	D	JOHN@CO.NET

92

94

96

98

USER-TERM TABLE

USER ID	TERM ID	CONFIDENCE
1	101	1000
1	201	300
2	101	250
2	301	200

112

114

116

118

TERM TABLE

TERM ID	TERM
101	NETWORK
201	PROCESSOR
301	RADIO

102

104

DOCUMENT TABLE

DOC ID	DOC
2010	EMAIL 1
2020	ATTACH
2030	REPORT

108

TERM-DOCUMENT TABLE

TERM ID	DOC ID	ADJ. COUNT
101	2010	2.8
101	2020	1.3
101	2030	3.1
201	2010	0.65

122

124

126

USER-DOCUMENT TABLE

USER ID	DOC ID
1	2010
2	2010
3	2030

130

132

134

FIGURE 6

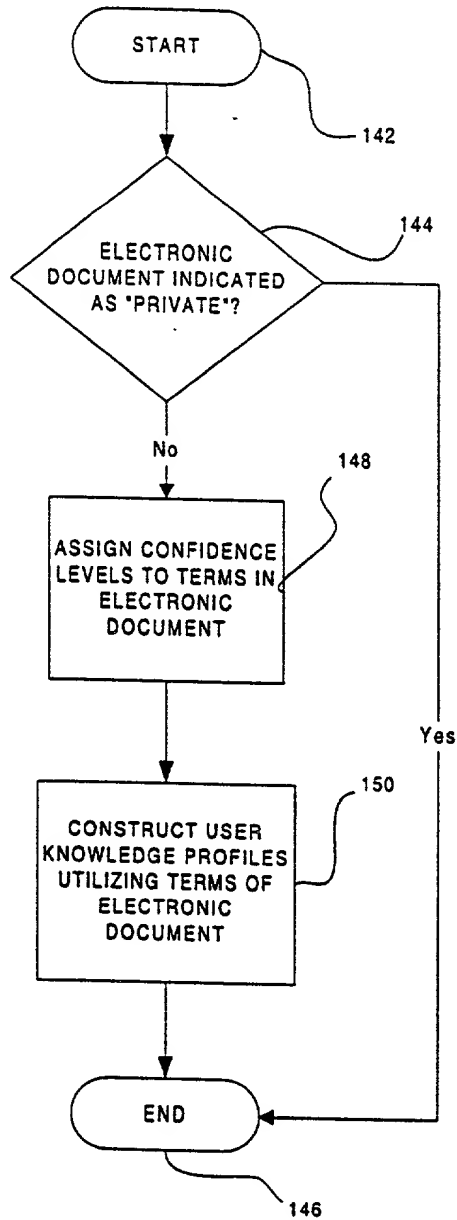


FIGURE 7

START

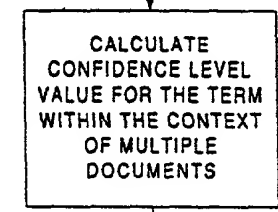
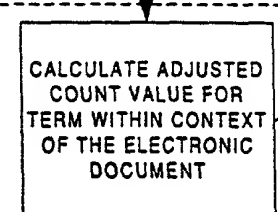
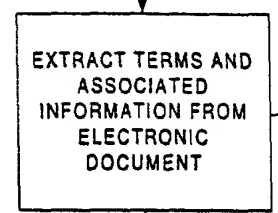
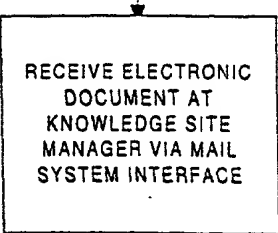


FIGURE 8

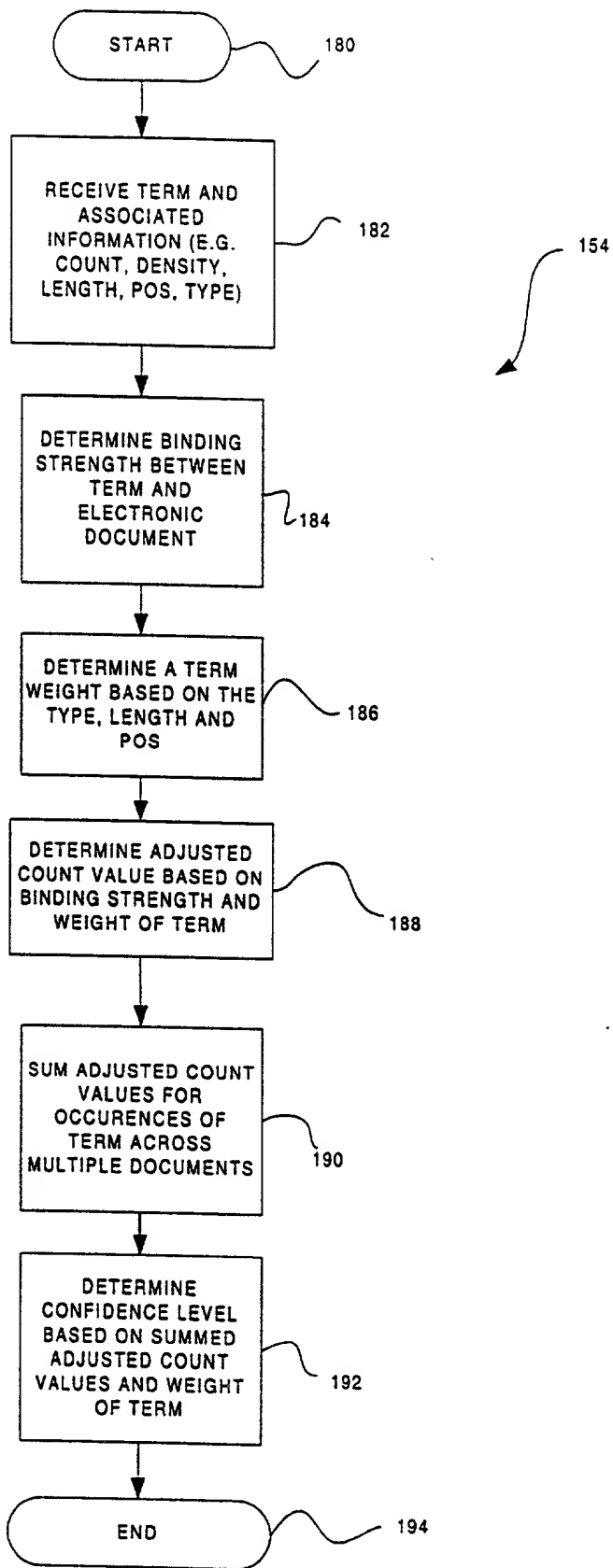


FIGURE 9A

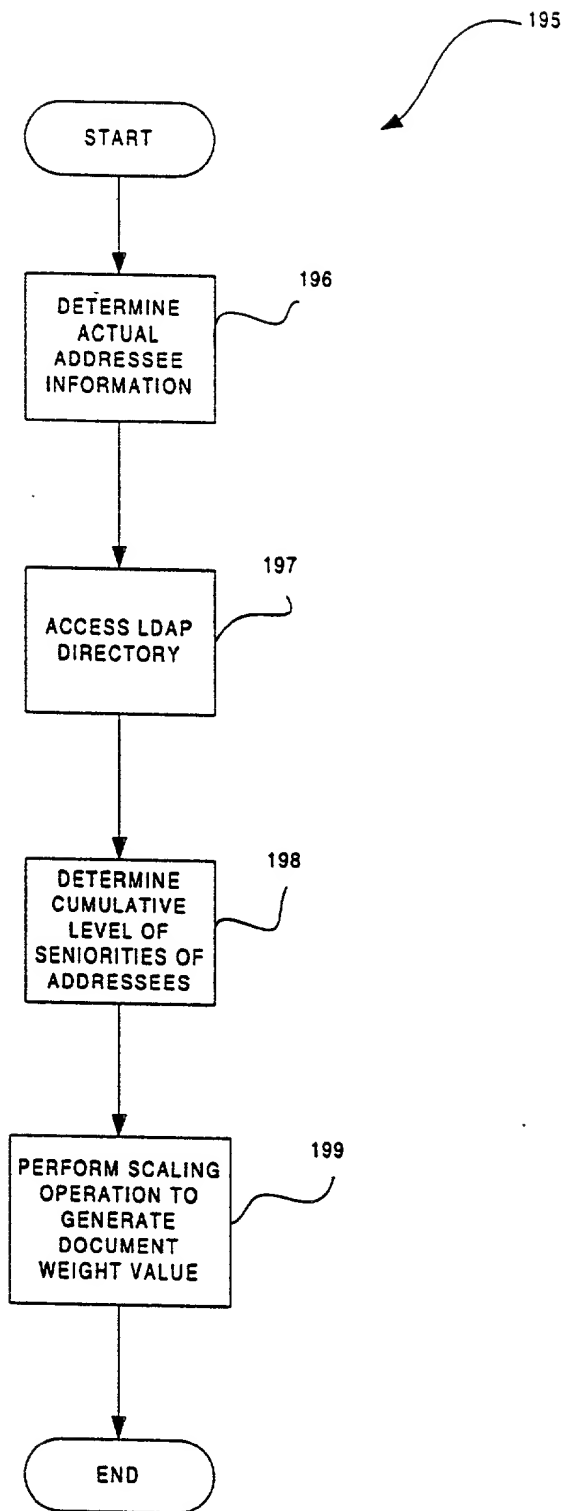


FIGURE 9B

200

TERM-DOCUMENT BINDING TABLE		
CLASS	NO. OF OCCURRENCES	DENSITY
A	X	4.00%
B	X	2.00%
C	X	1.00%
D	X	0.5%
E	3	X
F	1	X

202

204


206

FIGURE 10

220

	A	B	C	D	E	F
10	0	0	0	0	0	0
30	0	0	0	0	0	0
100	0.4	0.3	0.2	0.1	0.05	0
150	0.8	0.7	0.6	0.5	0.4	0.1
300	1.5	1.4	1.3	1	0.5	0.1
320	1.6	1.5	1.4	1.1	0.6	0.1
400	1.9	1.8	1.5	1.2	0.7	0.1
450	2	1.9	1.6	1.3	1	0.1

FIGURE 12



	0.063	0.125	>>>>>	32	64	128
10	0.1	0.2	>>>>>	55	100	200
30	0.3	0.6	>>>>>	180	350	600
100	1.6	2.8	>>>>>	600	1000	2100
150	2.5	5	>>>>>	1100	2000	5000
300	6.5	11	>>>>>	2700	6000	15000
320	7.1	11.5	>>>>>	2900	7000	16000
400	8	15	>>>>>	3500	8000	20000
450	9	18	>>>>>	4200	9000	24000

FIGURE 13



	0 0 6 3	0 1 2 5	> > > >	3 2	6 4	1 2 8
10	0	0	> > > >	50	100	200
30	0	0	> > > >	150	350	600
100	0	0	> > > >	600	1000	1000
150	0	0	> > > >	1000	1000	1000
300	0	0	> > > >	1000	1000	1000
320	0	0	> > > >	1000	1000	1000
400	0	25	> > > >	1000	1000	1000
450	0	25	> > > >	1000	1000	1000

FIGURE 14

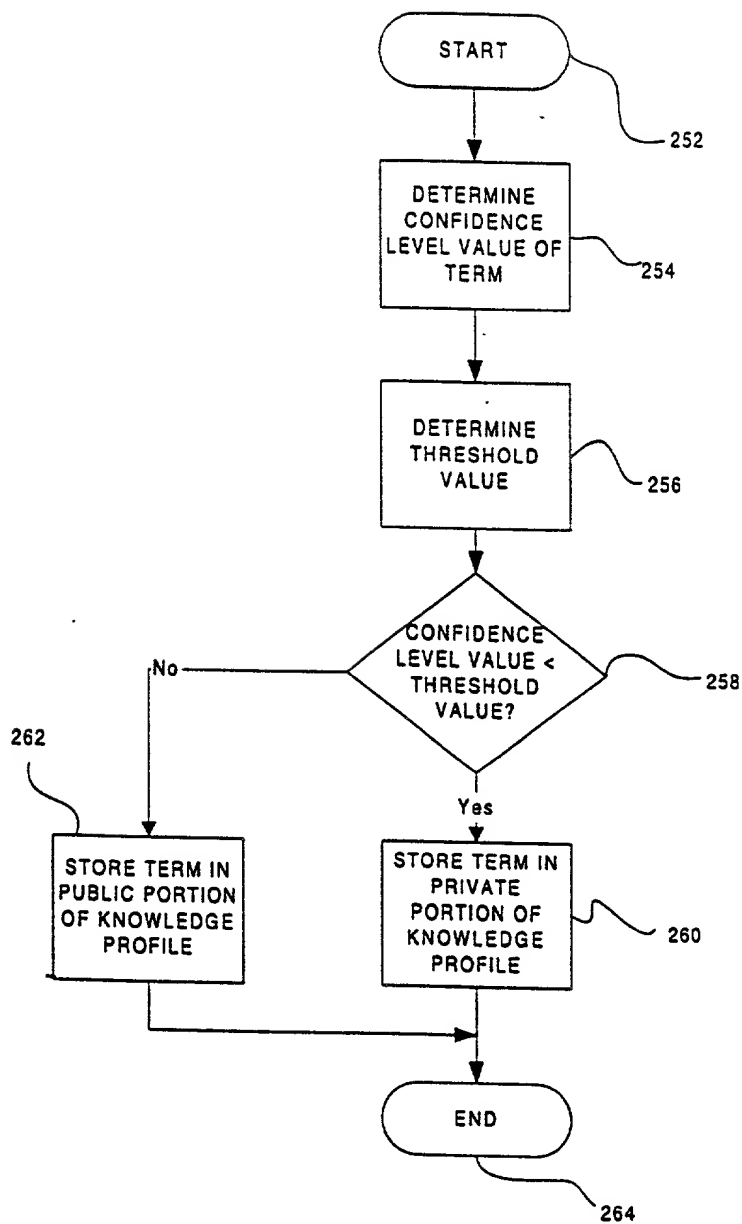


FIGURE 15A

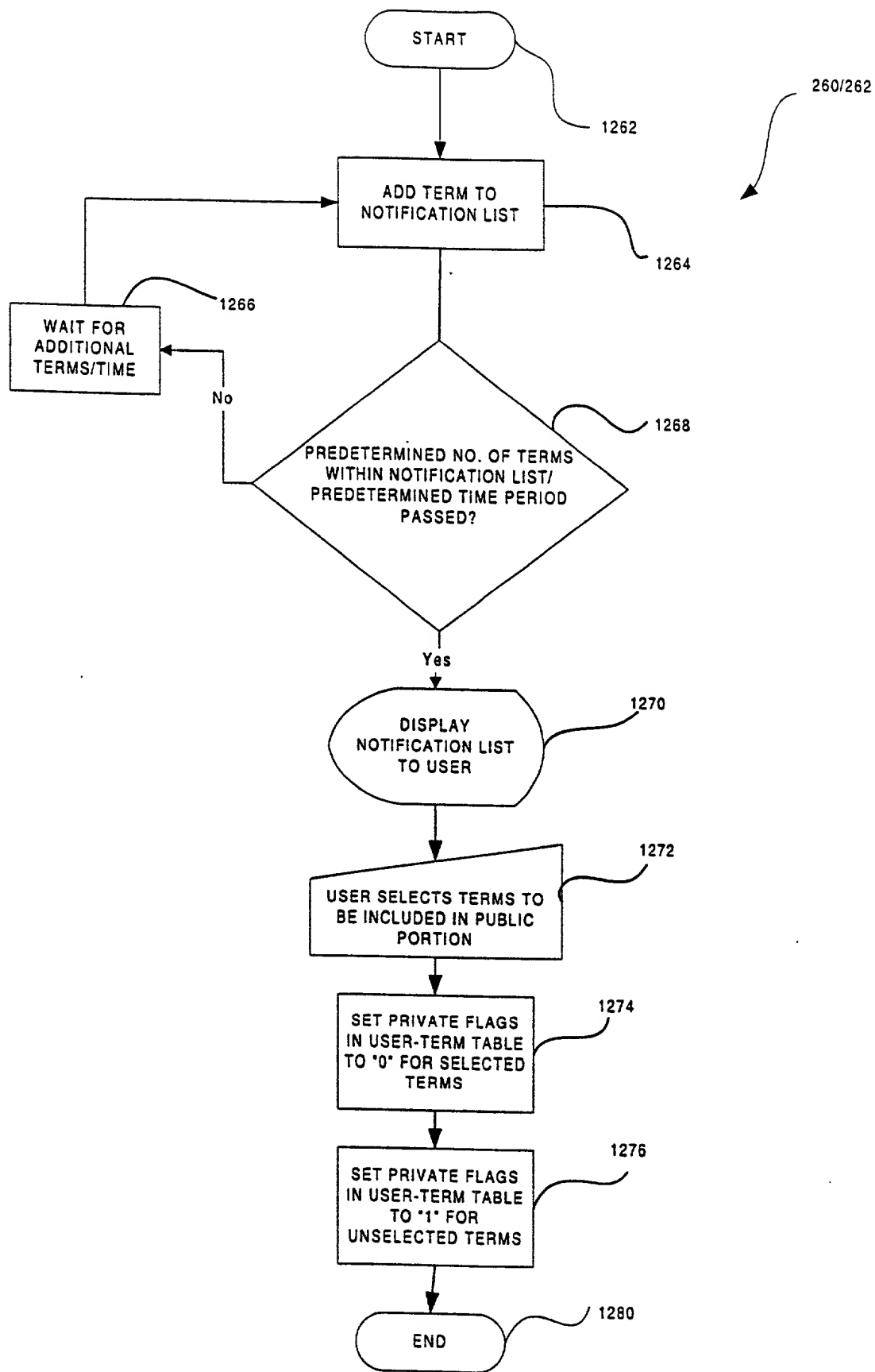


FIGURE 15B

112

USER ID	TERM ID	CONFIDENCE LEVEL
1	101	990
1	106	976
1	207	950
.	.	.
.	.	.
.	.	.
1	67	310
1	98	300
1	116	290
1	190	287
.	.	.
.	.	.
.	.	.
8	107	995
8	128	992
8	154	900
.	.	.
.	.	.
.	.	.
8	62	370
8	8	300
8	52	207
8	261	200
.	.	.
.	.	.
.	.	.

270

272

274

280

282

284

92

94

118

FIGURE 16A

112

USER ID	TERM ID	CONFIDENCE LEVEL	PRIVATE FLAG
1	101	990	0
1	106	976	0
1	207	950	1
.	.	.	.
.	.	.	.
.	.	.	.
1	67	310	0
1	98	300	1
1	116	290	0
1	190	287	0
.	.	.	.
.	.	.	.
.	.	.	.
8	107	995	1
8	128	992	0
8	154	900	0
.	.	.	.
.	.	.	.
.	.	.	.
8	62	370	0
8	8	300	0
8	52	207	0
8	261	200	0
.	.	.	.
.	.	.	.
.	.	.	.

92 94 118 119

FIGURE 16B

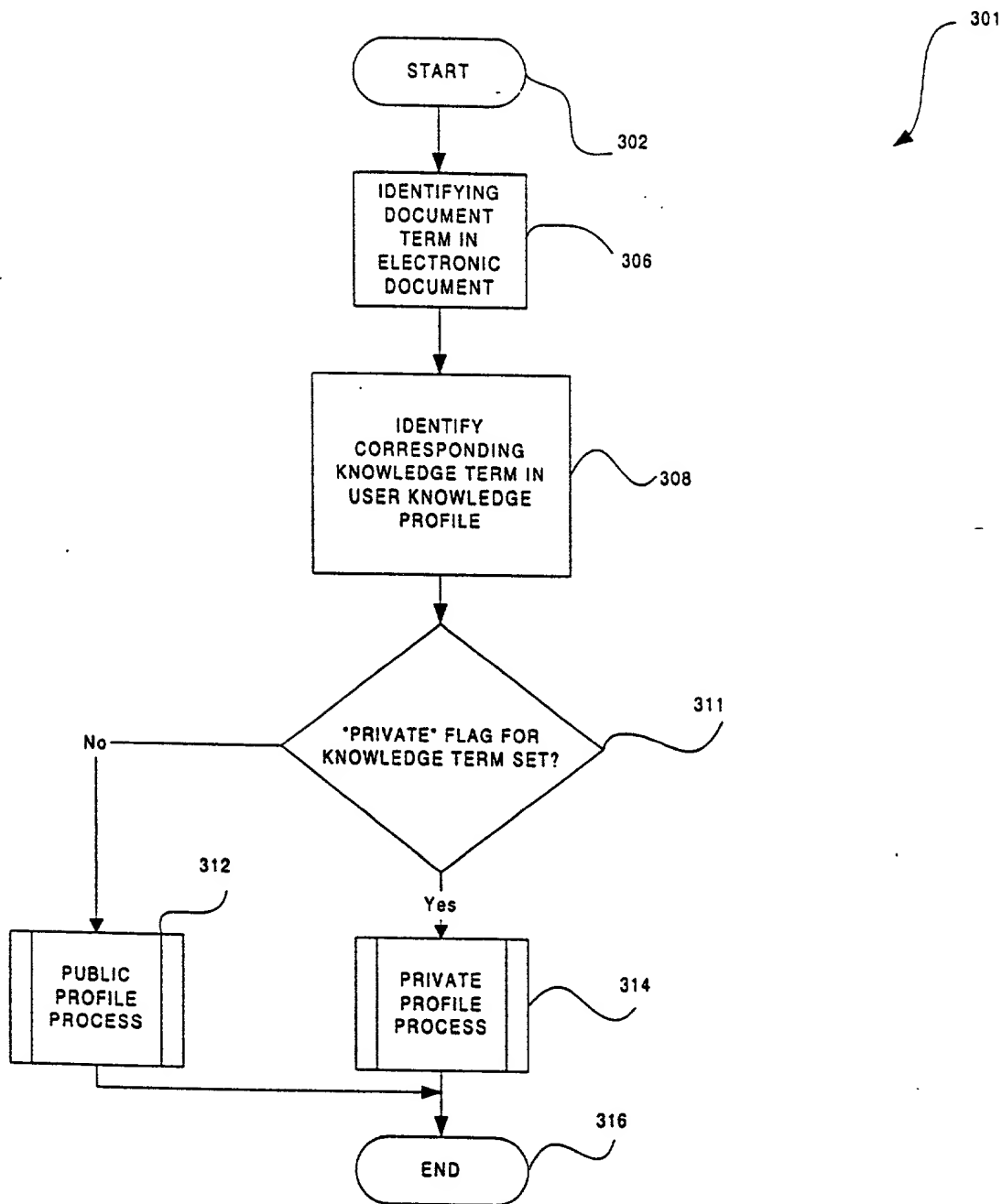


FIGURE 17B

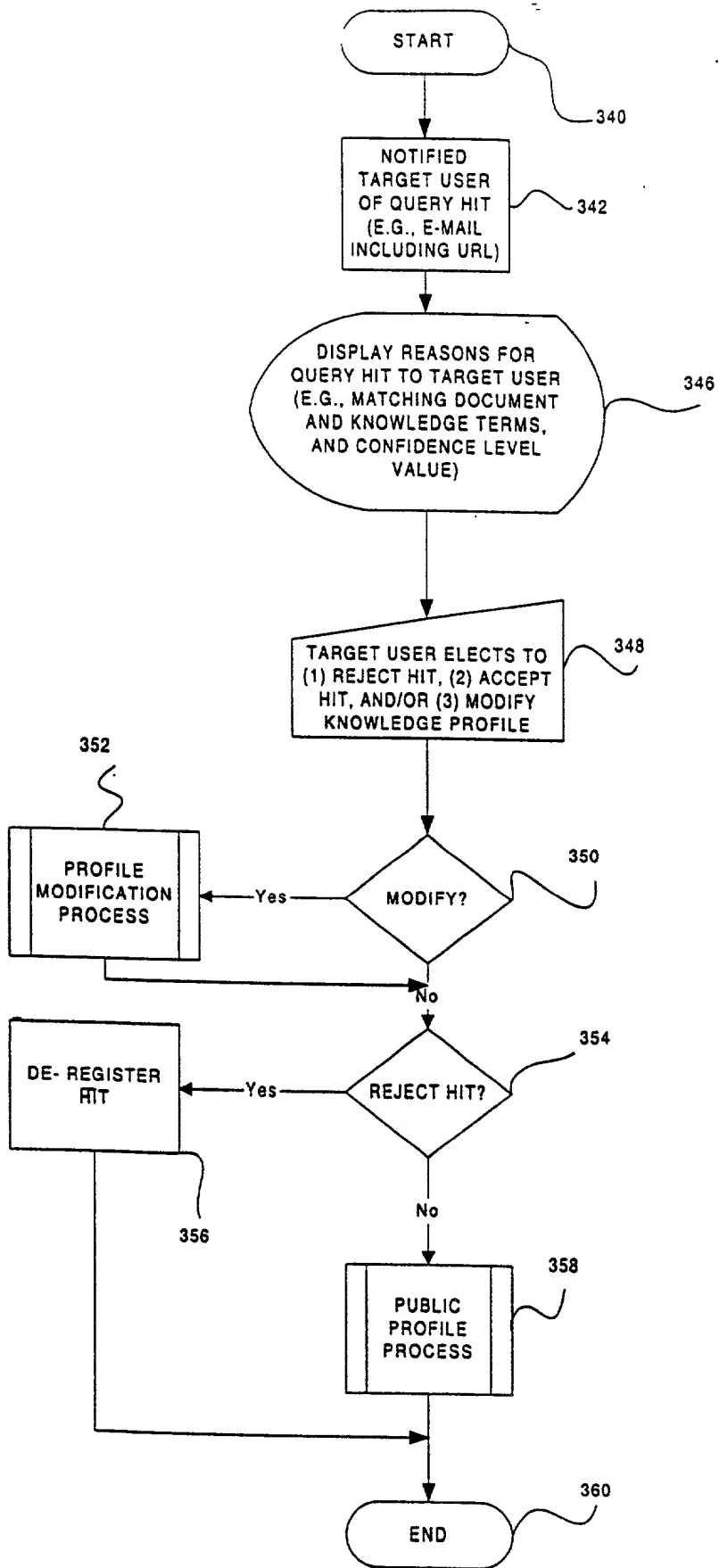


FIGURE 17D

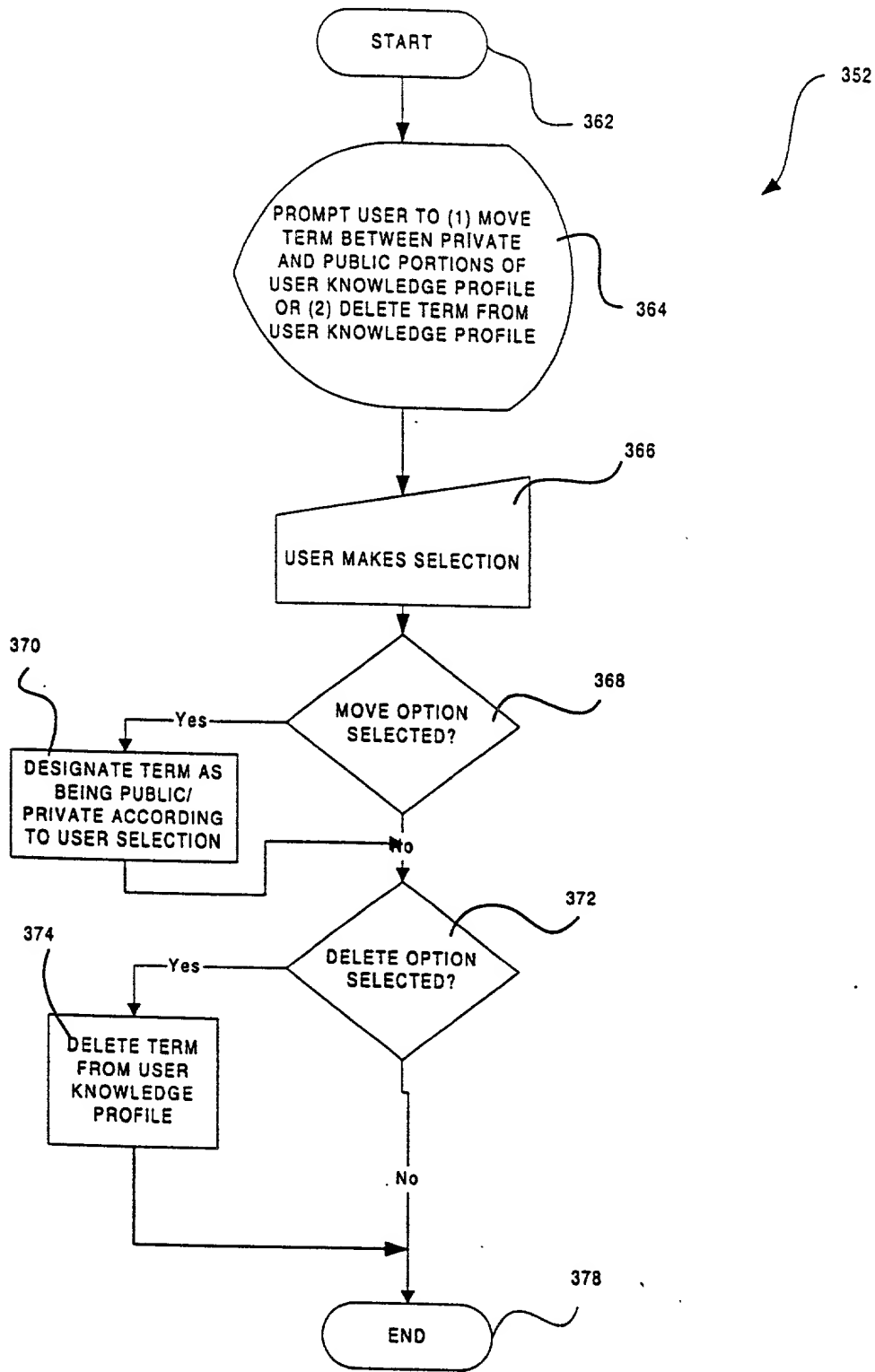


FIGURE 17E

```
graph TD
    402([START]) --> 401[DETERMINE IF DRAFT MESSAGE BODY EXCEEDS PREDETERMINED LENGTH]
    401 --> 404[TRANSMIT MESSAGE BODY TO KNOWLEDGE ACCESS SERVER USING HTTP VIA WEB SERVER]
    404 --> 406[KNOWLEDGE ACCESS SERVER PROCESSES MESSAGE BODY]
    406 --> 408[KNOWLEDGE ACCESS SERVER TRANSMITS POTENTIAL RECIPIENTS LIST AND ASSOCIATED INFORMATION TO CLIENT]
    408 --> 410[PRESENT LIST OF POTENTIAL RECIPIENTS TO USER UTILIZING CLIENT]
    410 --> 412{"'EXPLAIN' FUNCTION SELECTED?"}
    412 -- Yes --> A((A))
    412 -- No --> 422
    B((B)) --> 422
    422{"'MORE' FUNCTION SELECTED?"}
    422 -- Yes --> C((C))
    422 -- No --> 432[USER ADDS SELECTED POTENTIAL RECIPIENTS TO 'TO:', 'CC:' OR 'BCC:' LISTS FOR MESSAGE]
    432 --> 434[TRANSMIT MESSAGE TO ACTUAL RECIPIENTS]
    434 --> 436([END])
```

Flowchart 400 illustrates a method for determining potential recipients of an email message. The process begins with a START terminal (402), leading to a decision block (401) to determine if the draft message body exceeds a predetermined length. If it does, the process proceeds to block (404) to transmit the message body to a knowledge access server using HTTP via a web server. The server then processes the message body (406) and transmits a potential recipients list and associated information to the client (408). The client presents this list to the user (410). A decision is made (412) if the "EXPLAIN" function is selected. If Yes, the process goes to terminal A. If No, it proceeds to decision block (422) to check if the "MORE" function is selected. If Yes, it goes to terminal C. If No, the user adds selected potential recipients to the "TO:", "CC:", or "BCC:" lists for the message (432). The message is then transmitted to the actual recipients (434), and the process ends (436).

FIGURE 18A

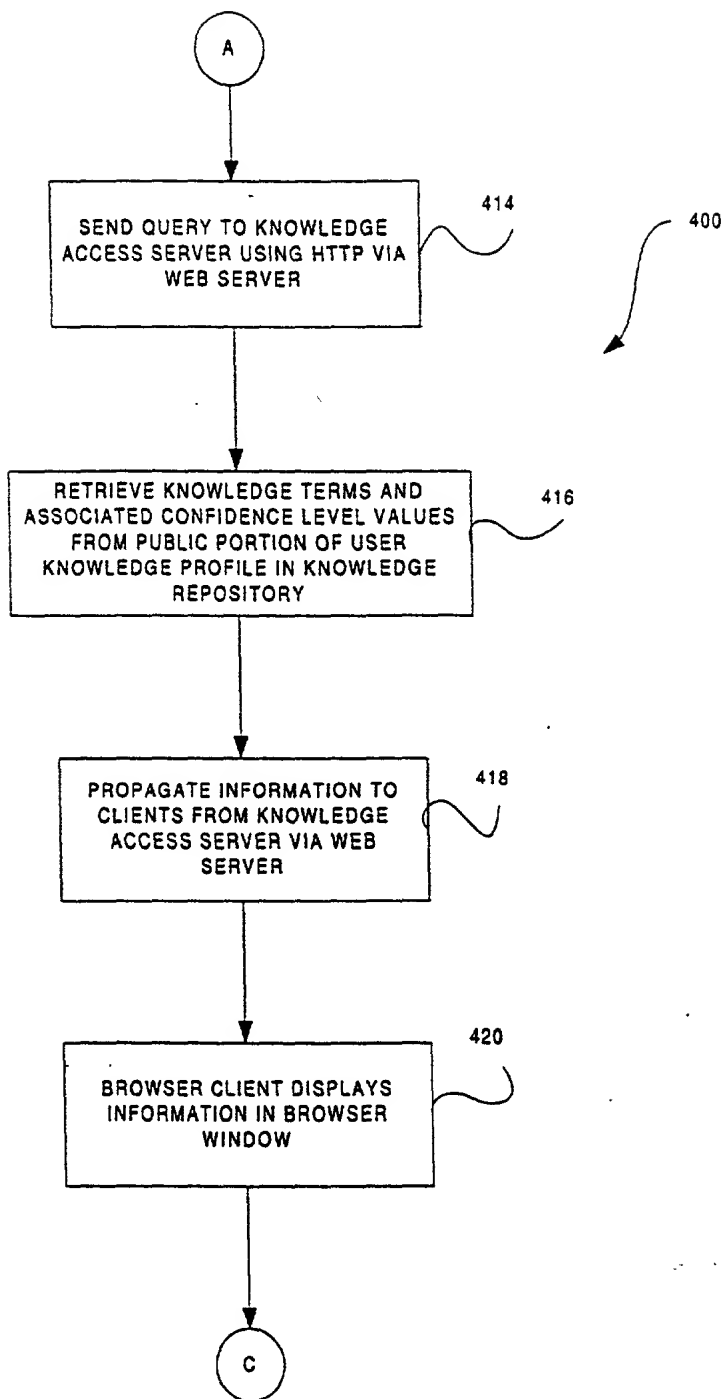


FIGURE 18B

DATE OF "BATEO/60"

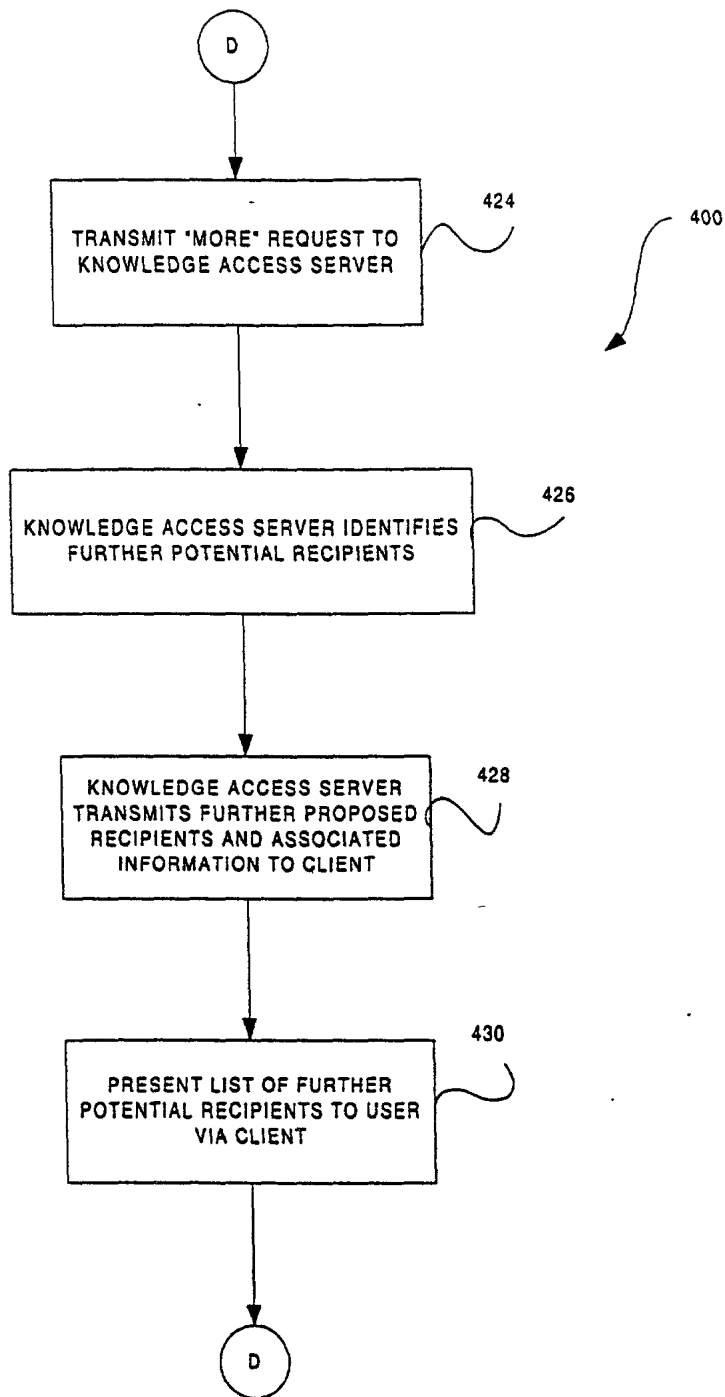


FIGURE 18C

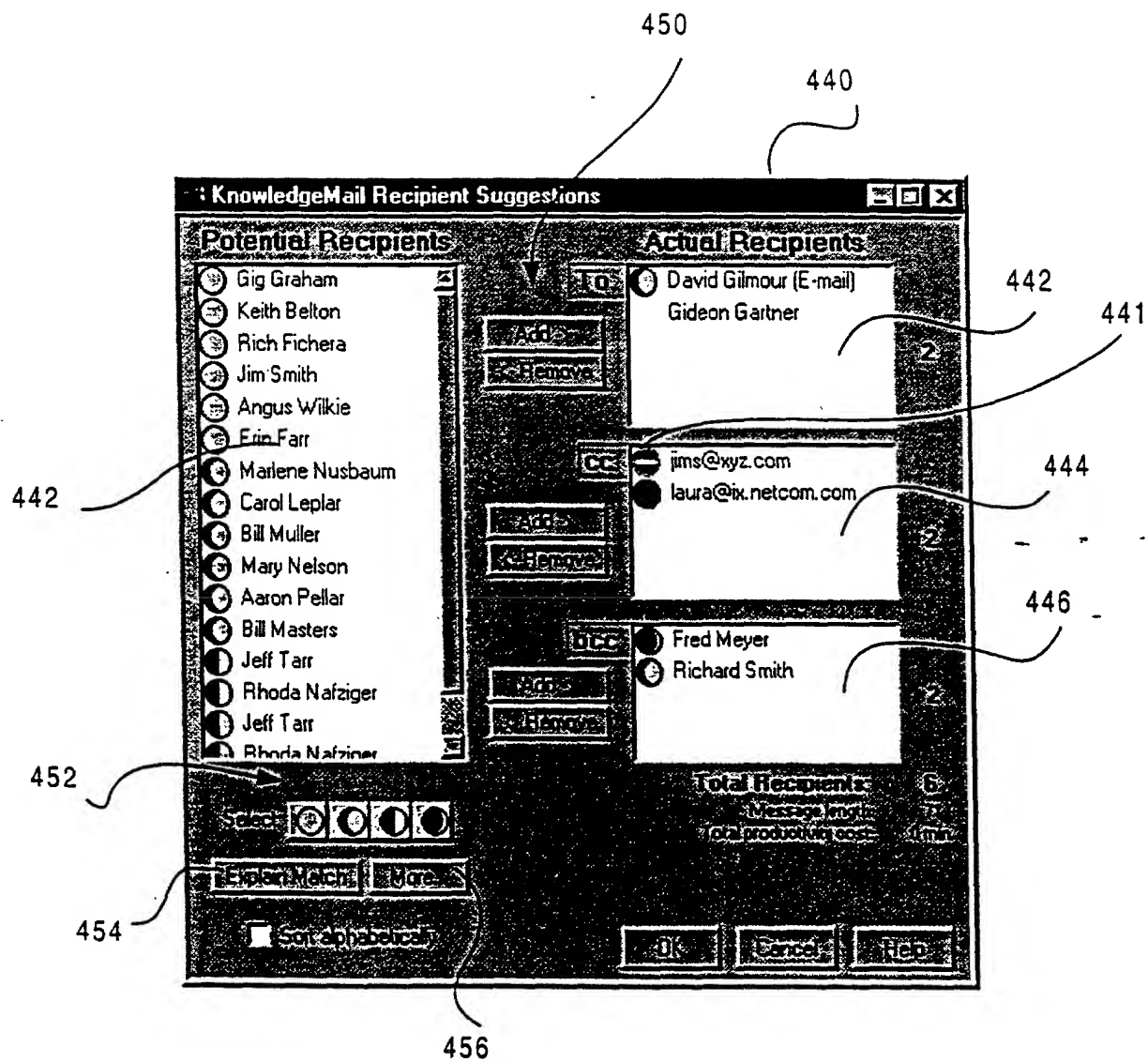


FIGURE 18D

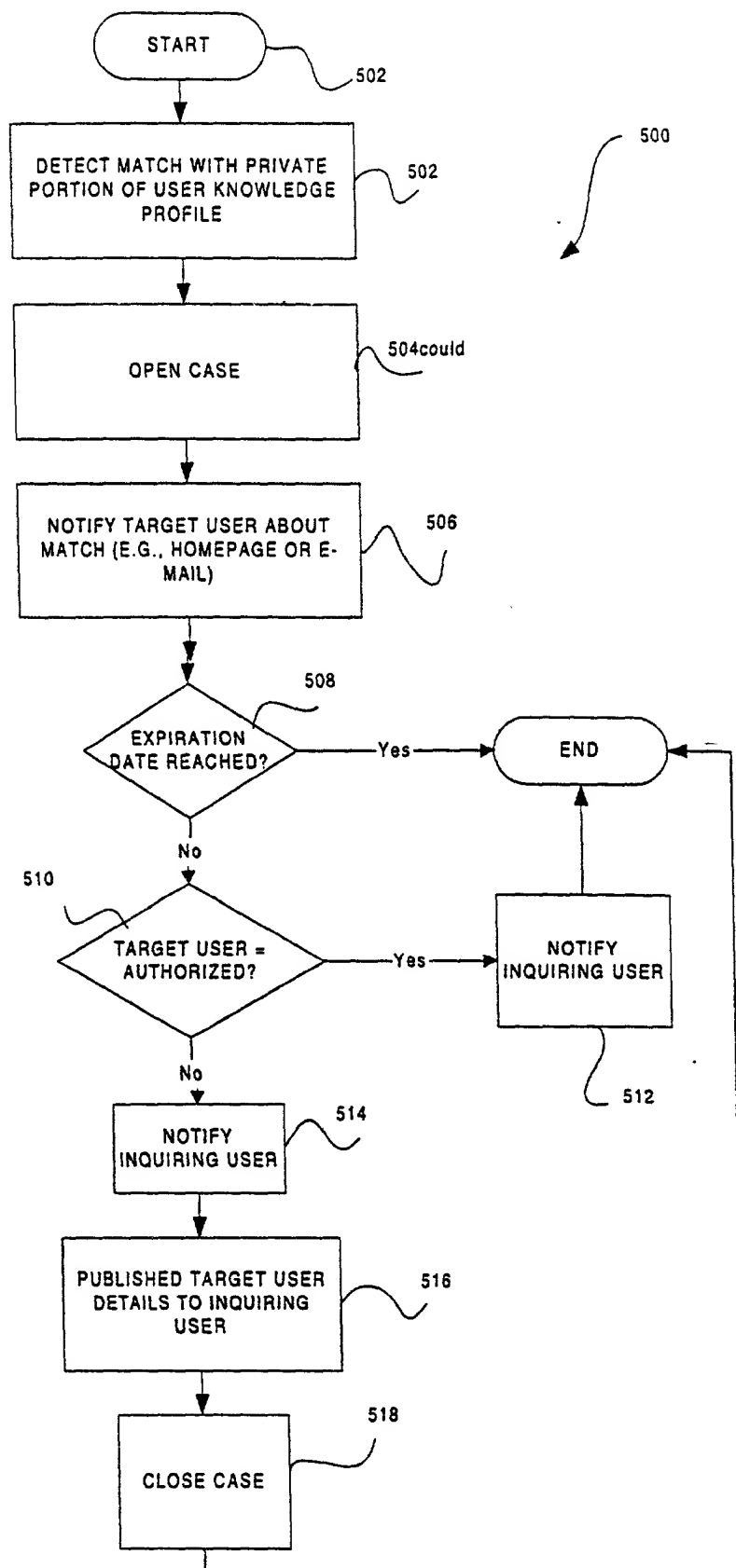


FIGURE 19

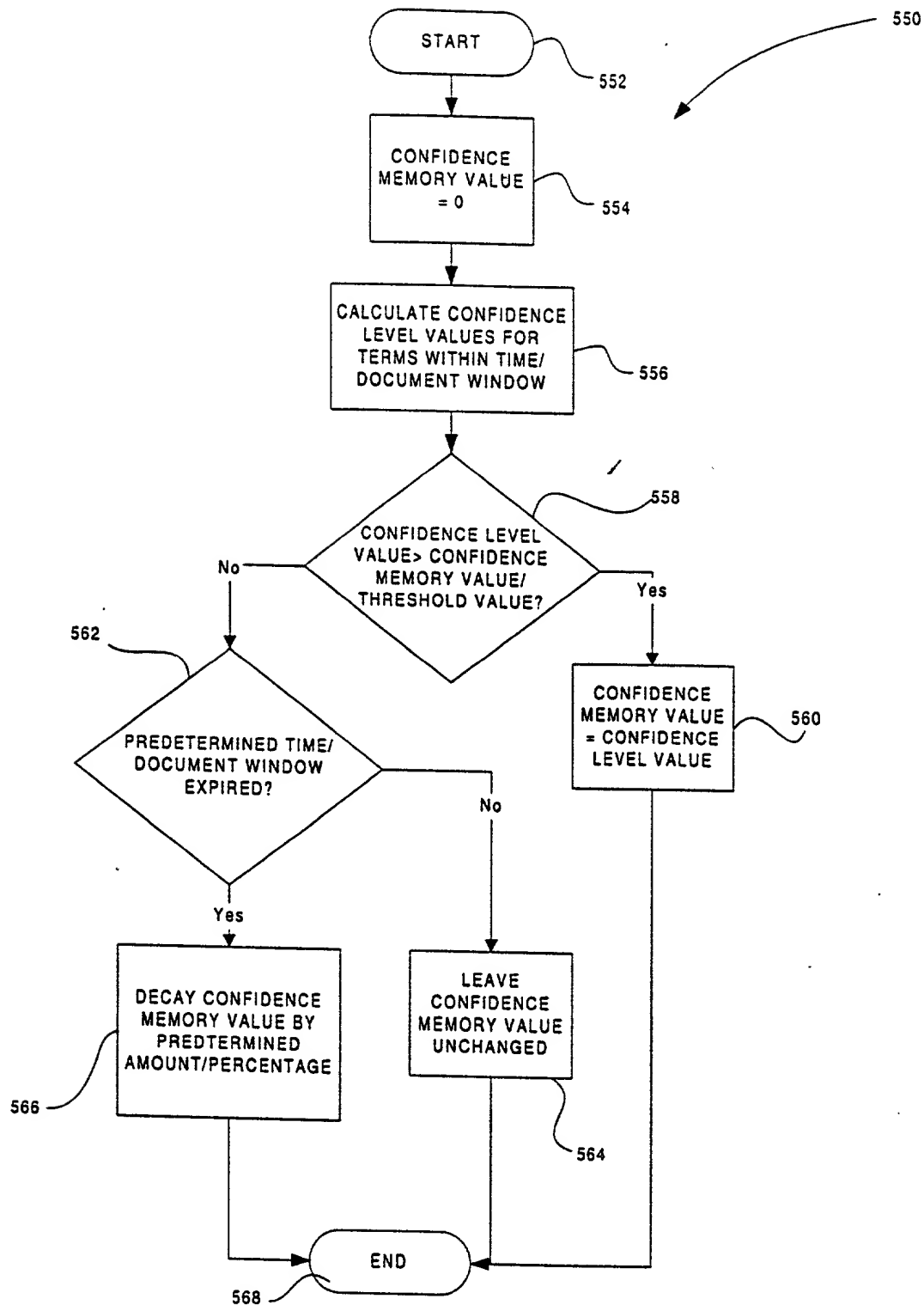


FIGURE 20

```

graph TD
    570((START)) --> 572[DETERMINE  
CONFIDENCE  
LEVEL VALUE]
    572 --> 574[DETERMINE  
CONFIDENCE  
MEMORY VALUE]
    574 --> 576{CONFIDENCE LEVEL  
VALUE > CONFIDENCE  
MEMORY VALUE}
    576 -- No --> 582[RETURN  
CONFIDENCE  
MEMORY VALUE]
    582 --> 584((END))

```

FIGURE 21

112

USER ID	TERM ID	CONFIDENCE LEVEL	CONFIDENCE MEMORY	TIME STAMP
1	101	990	990	9812120800
1	106	976	976	9807241400
1	207	950	950	9805121200
.
.
.
1	67	310	310	9812241900
1	98	300	300	9802110700
1	116	290	290	9804120900
1	190	287	287	9806060900
.
.
.
8	107	995	995	9811191000
8	128	992	992	9811201000
8	154	900	900	9712291300
.
.
.
8	62	370	370	9812181421
8	8	300	300	9812211600
8	52	207	207	9802021647
8	261	200	200	9802221147
.
.
.
92	94	118	121	123

FIG. 22

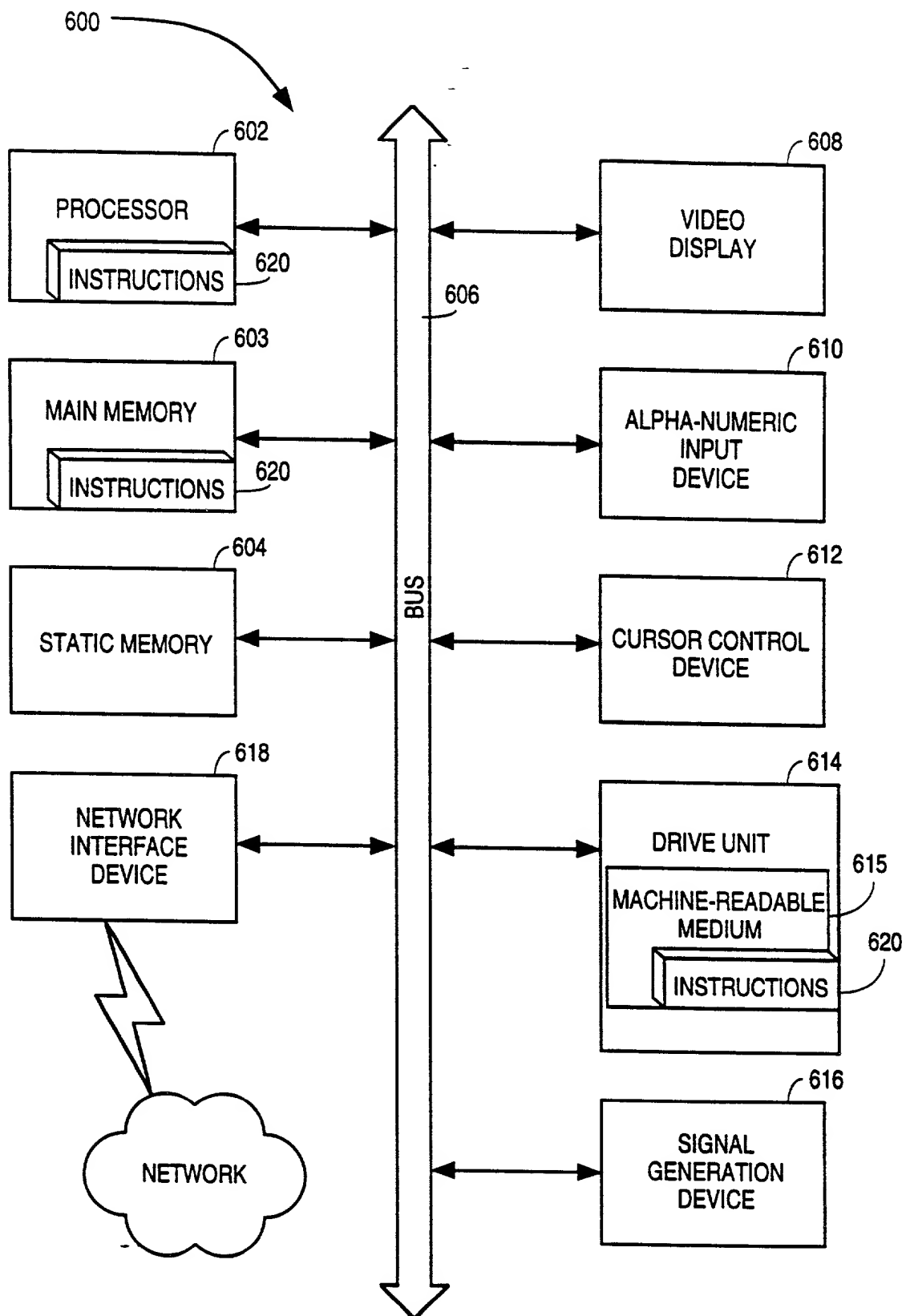


FIG. 23

New Memo - Lotus Notes

File Edit View Create Actions Text Help

Welcome Inbox New Memo X

Send KnowledgeMail Search KnowledgeSweep KnowledgeMail Configuration

To: Brian;Joe;Jon;Mark;Jim;Eric

cc:

bcc:

Subject: Welcome KnowledgeMail Users

☒ Send to my KnowledgeMail profile.

Dear employee,

We have just implemented an exciting new application within our organization. This application, called KnowledgeMail, is designed to make finding people within our organization as easy as using email or browsing the web! The key is the software's ability to help us generate private profiles based on email and other documents. You can publish some or all of the knowledge in your private profile to make it easy for other users

Office

700

New Memo - Lotus Notes

File Edit View Create Actions Text Help

Welcome Inbox **New Memo**

Send KnowledgeMail Search KnowledgeSweep KnowledgeMail Configuration

notes

Define Criteria

Title	contains	Sales
Country is USA		

☐ Save as default search criteria

Find Now **Cancel** **Help**

Dear emp

We have within o

Knowledge

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generate

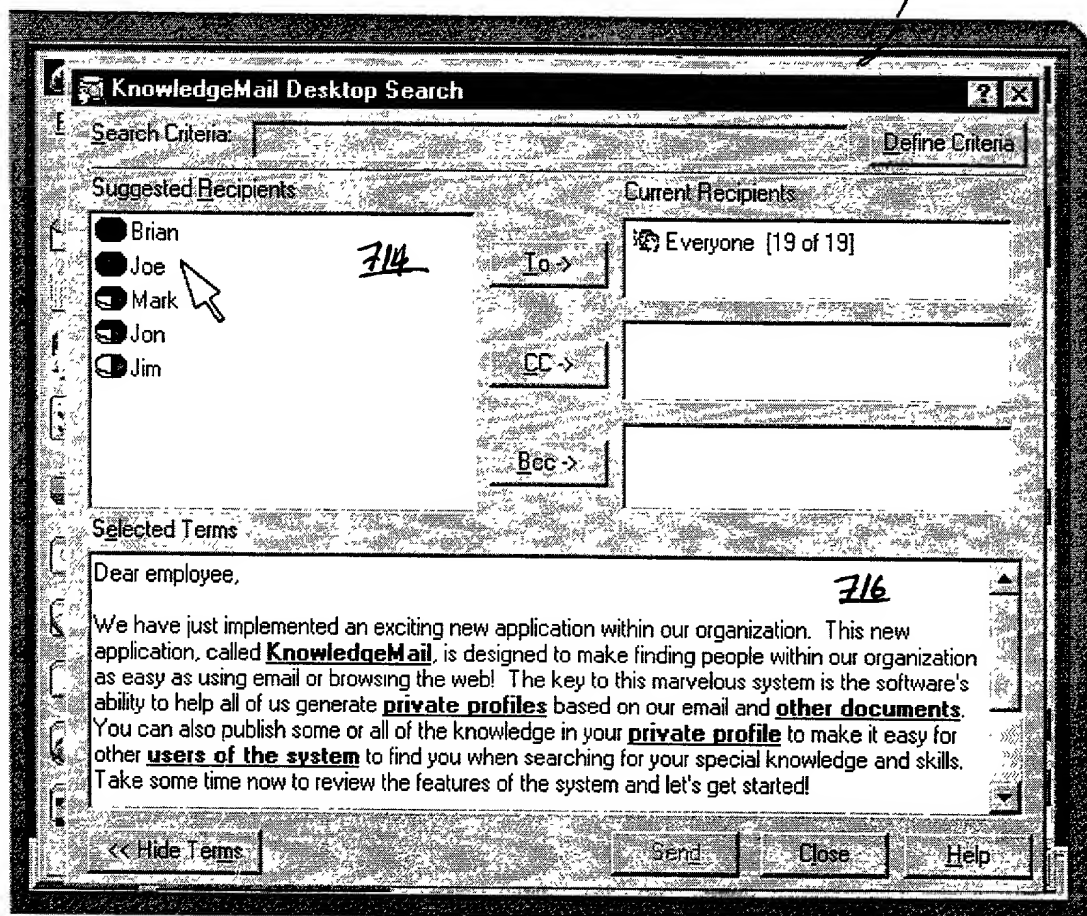
document

in your private profile to ma

it easy for other users

Office

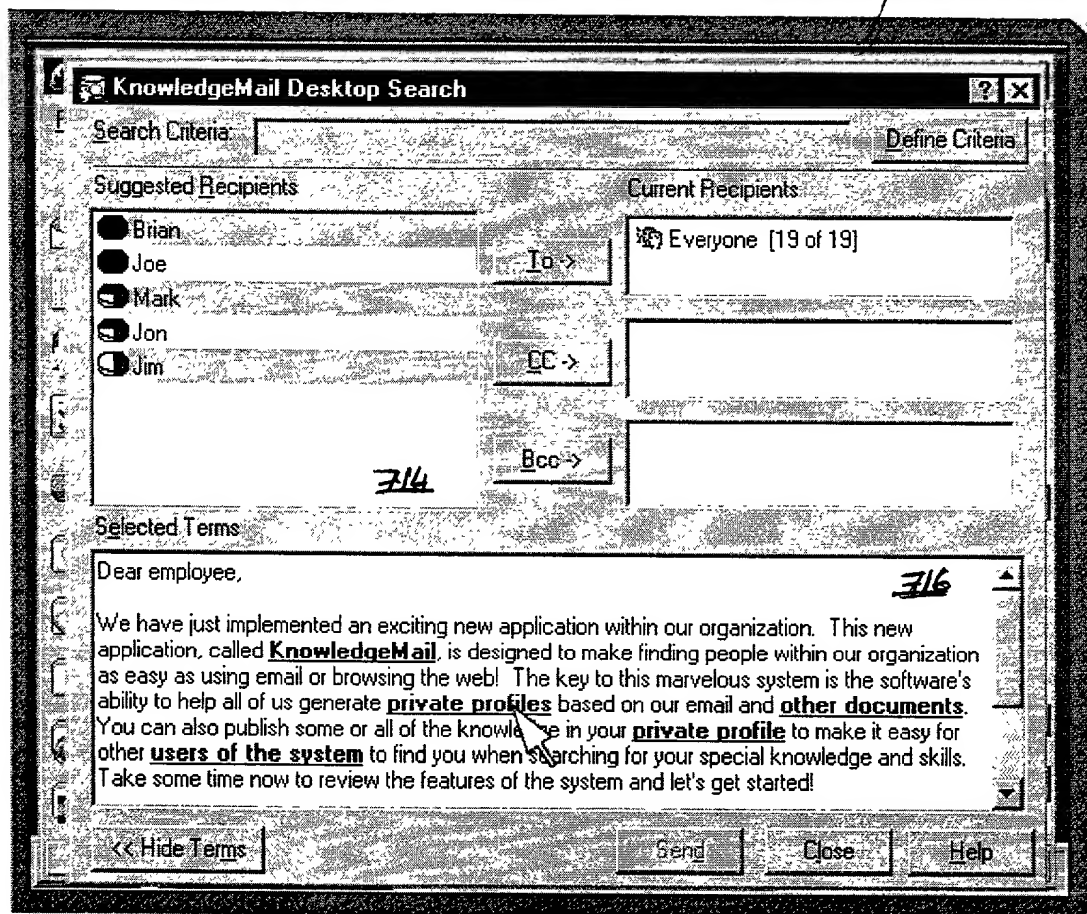
FIG. 24B

[illegible]

700

FIG. 24C

Variable	Mean	SD	Min	Max
Age	34.5	10.2	22	55
Gender	0.45	0.50	0	1
Marital status	0.60	0.49	0	1
Education	12.5	1.5	9	16
Income	1500	500	500	3000
Health status	0.70	0.46	0	1
Smoking status	0.30	0.46	0	1
Alcohol consumption	0.20	0.40	0	1
Exercise frequency	0.10	0.30	0	1
Stress level	0.50	0.50	0	1
Sleep quality	0.60	0.49	0	1
Work satisfaction	0.70	0.46	0	1
Life satisfaction	0.80	0.39	0	1
Depression score	10.5	5.0	0	20
Anxiety score	12.0	6.0	0	25
Quality of life score	75.0	10.0	60	90



700

FIG. 24D

Variable	Mean	SD	Min	Max
Age	34.5	10.2	18	65
Gender	Male	1.0	0	1
Marital status	Married	1.0	0	1
Education	High school	1.0	0	1
Occupation	Unemployed	1.0	0	1
Income	Low	1.0	0	1
Health status	Good	1.0	0	1
Smoking status	Non-smoker	1.0	0	1
Alcohol consumption	Non-drinker	1.0	0	1
Exercise frequency	Low	1.0	0	1
Stress level	Low	1.0	0	1
Sleep quality	Good	1.0	0	1
Family size	Small	1.0	0	1
Religious beliefs	Religious	1.0	0	1
Community involvement	Active	1.0	0	1
Life satisfaction	High	1.0	0	1
Resilience	High	1.0	0	1
Optimism	High	1.0	0	1
Gratitude	High	1.0	0	1
Forgiveness	High	1.0	0	1
Empathy	High	1.0	0	1
Compassion	High	1.0	0	1
Kindness	High	1.0	0	1
Generosity	High	1.0	0	1
Patience	High	1.0	0	1
Self-control	High	1.0	0	1
Emotional stability	High	1.0	0	1
Psychological well-being	High	1.0	0	1
Life purpose	High	1.0	0	1
Meaning in life	High	1.0	0	1
Existential well-being	High	1.0	0	1
Transcendental well-being	High	1.0	0	1
Overall well-being	High	1.0	0	1

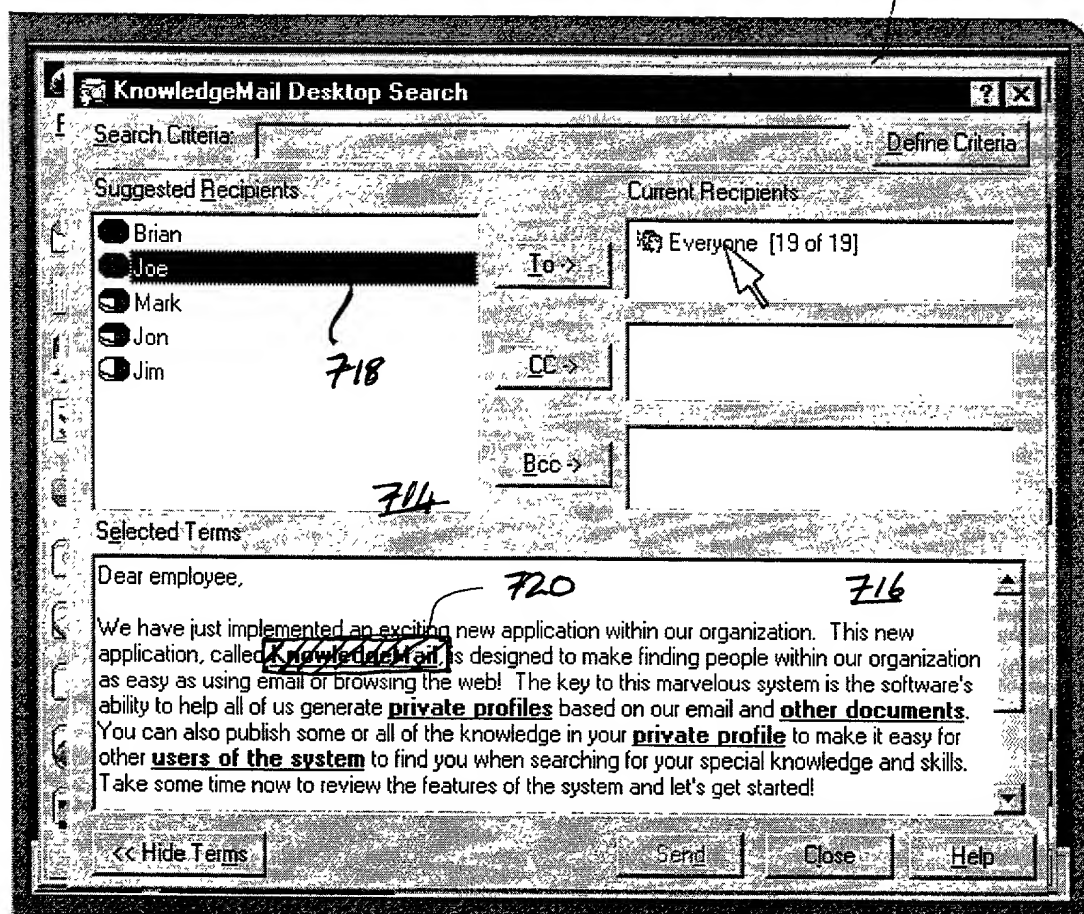


FIG. 24E

700

KnowledgeMail Desktop Search

Search Criteria: Define Criteria...

Suggested Recipients

- ☐ Brian
- ☒ Joe
- ☐ Mark
- ☐ Jon
- ☐ Jim

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Selected Terms

Dear employee,

We have just implemented an application, called KnowledgeMail, as easy as using email, to help all of us. You can also publish other users of the system. Take some time now to review the features of the system and let's get started!

Everyone at Tacit List Members

List Members:

- ☐ ? Arathi
- ☐ ? Bill
- ☐ ? Charlotte
- ☐ ? Stephen
- ☒ ☐ Brian
- ☒ ☐ Joe
- ☒ ☐ Jon
- ☒ ☐ Mark
- ☒ ☐ Jim
- ☒ ☐ Eric
- ☐ ☐ Albert
- ☐ ☐ Cheri

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This new application is the software's way of making it easy for us to share our knowledge and skills.

Show Terms >> **OK** **Help**

<< Hide Terms **Send** **Close** **Help**



FIG. 24F

001601" 68160260

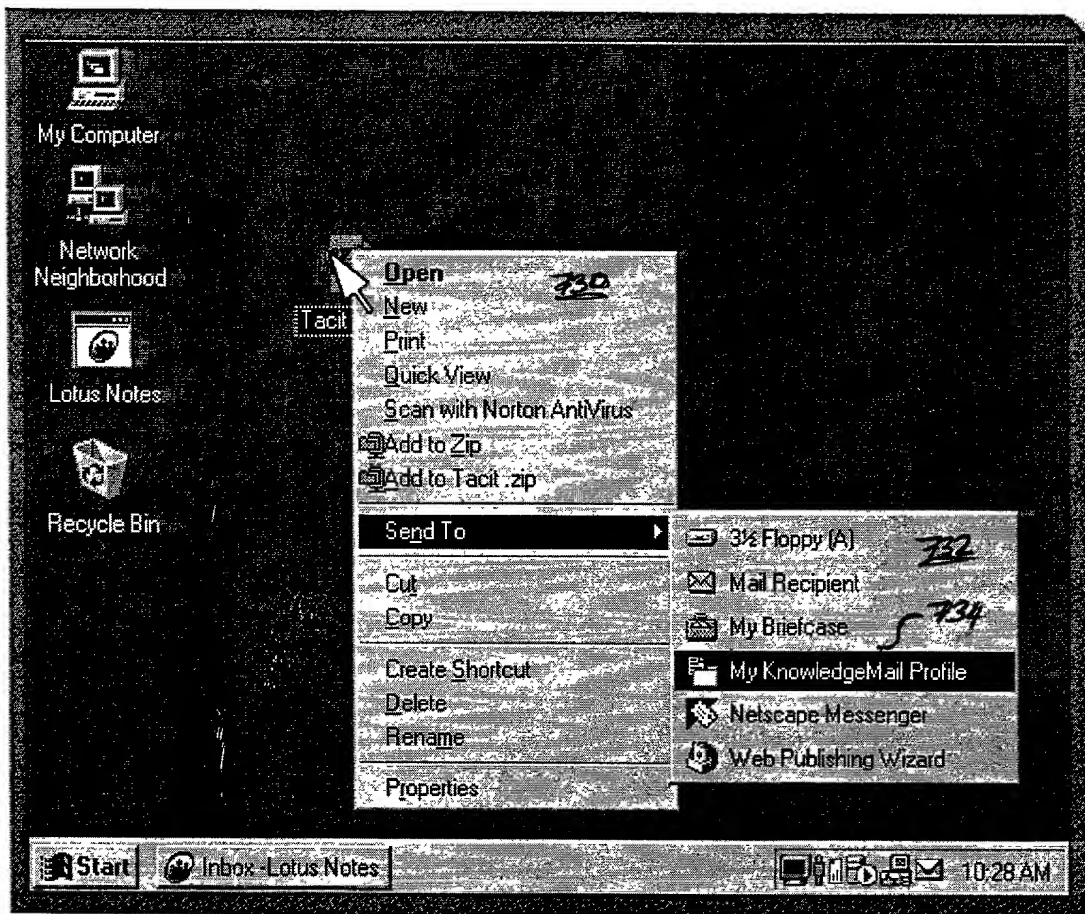


FIG. 25A

KnowledgeMail Desktop Profiler

Set the title and profiler action for each file being sent to the KnowledgeMail profiler.

F36

Title	Filename	Profiler Action
<input type="checkbox"/> Working with Tacit Knowledge	C:\WINNT\...	Publish and send to repository

Add
Remove
Edit Title

Profiler Action

Document: Working with Tacit Knowledge

☐ Include all terms in published profile without further review

☐ Send document to repository

Send
Cancel
Help

Start | Inbox - Lotus Notes | 10:28 AM

FIG 25B

740

My Computer

Network Neighborhood

Tacit.doc

Lotus Notes

Recycle Bin

Open KnowledgeMail Portal...

Search...

Send To My Profile... 744

KnowledgeSweep...

Alerts 742

Configure...

Logout

Visit Tacit.com...

About KnowledgeMail Desktop...

Help...

Exit

Start | Inbox - Lotus Notes | BAM

FIG. 26B

FIG 26C

FIG. 26D

FIG 26E

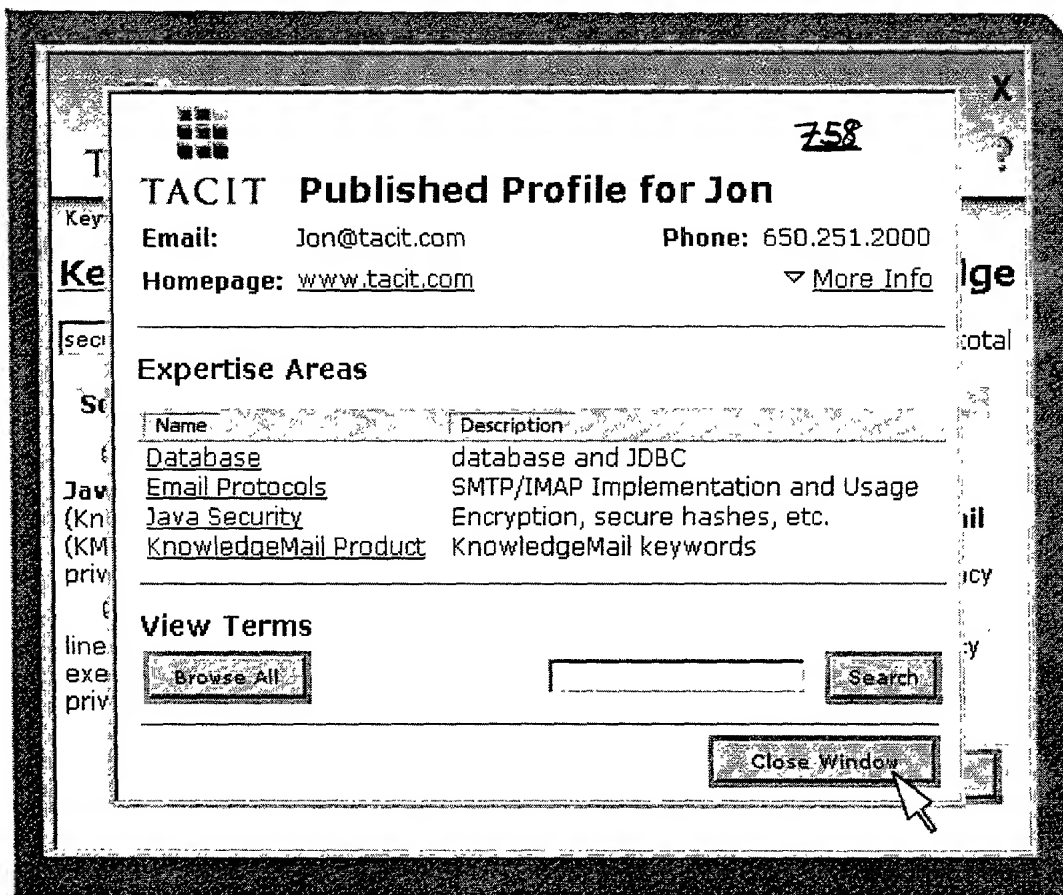


FIG 26F

FIG 26G

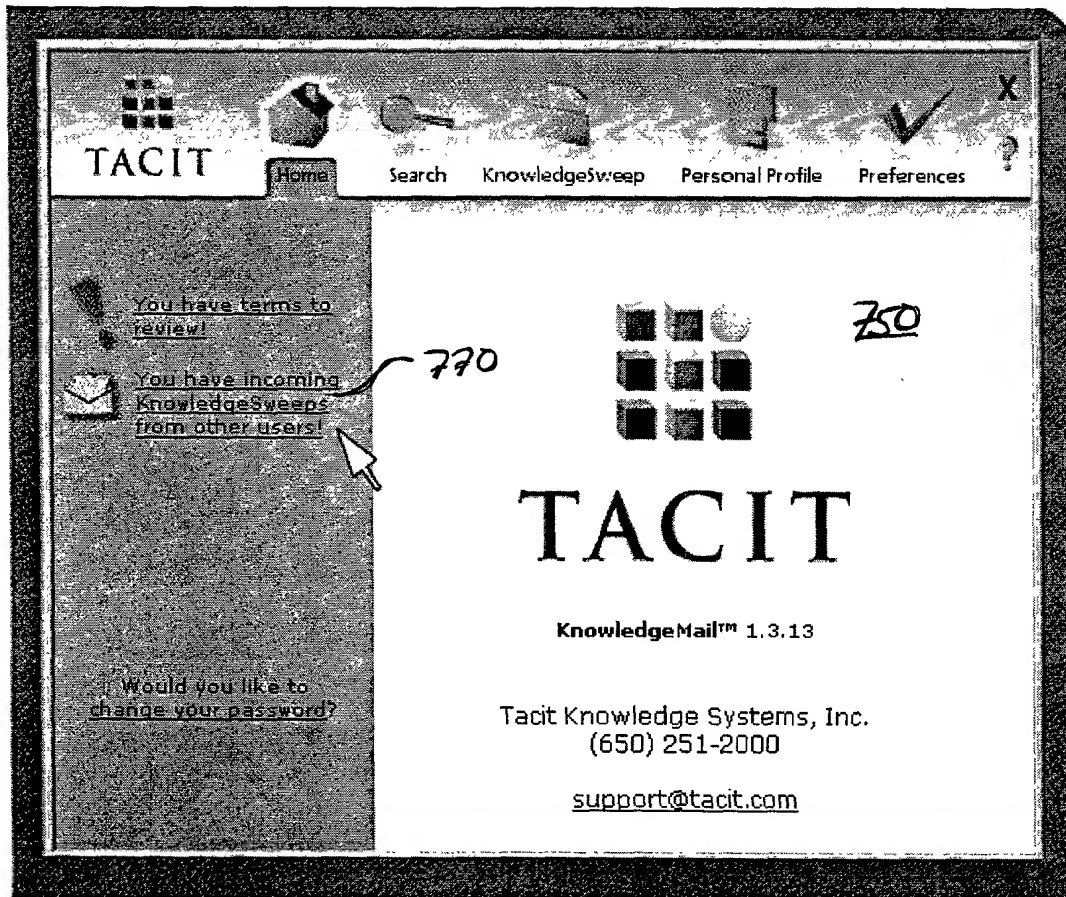


FIG 26H



KnowledgeSweep Request : Response

This KnowledgeSweep matched your unpublished terms so your identity has not been revealed.

772

User: Mark

Mark

Phone:

2092

Email: Mark@Tacit.com

Mark@Tacit.com

Department:

Education

Subject: Privacy and Security

Privacy and Security

Comment: I am searching for information on an exciting new product

Response Choices:

☒ Close this KnowledgeSweep by...

- making myself known to Lance

☐ ignoring the request.

☐ Refer Lance to another KnowledgeMail user:

1. The following information is for informational purposes only and is not intended to be used for any other purpose. It is not a contract and does not constitute an offer of insurance. It is not a policy and does not contain the actual terms, coverages, amounts, conditions, exclusions, and limitations of the policy. It is not a statement of fact and does not constitute an offer of insurance. It is not a policy and does not contain the actual terms, coverages, amounts, conditions, exclusions, and limitations of the policy.

FIG 26 I

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD AND SYSTEM FOR ADDRESSING A COMMUNICATION FOR TRANSMISSION
OVER A NETWORK BASED ON THE CONTENT THEREOF

the specification of which

X is attached hereto.
_____ was filed on (MM/DD/YYYY) _____ as
United States Application Number _____
or PCT International Application Number _____
and was amended on (MM/DD/YYYY) _____.
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Priority
Claimed

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below:

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

I hereby appoint the persons listed on Appendix A hereto (which is incorporated by reference and a part of this document) as my respective patent attorneys and patent agents, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to André L. Marais, BLAKELY, SOKOLOFF, TAYLOR &
(Name of Attorney or Agent)
ZAFMAN LLP, 12400 Wilshire Boulevard 7th Floor, Los Angeles, California 90025 and direct
telephone calls to André L. Marais, (408) 720-8300.
(Name of Attorney or Agent)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor David L. Gilmour

Inventor's Signature _____ Date _____

Residence Los Altos Hills, California Citizenship USA
(City, State) (Country)

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Los Altos Hills, CA 94022

Full Name of Second/Joint Inventor Hua-Wen Wang

Inventor's Signature _____ Date _____

Residence Milpitas, California Citizenship Taiwan
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Post Office Address 2159 Calle Vista Verde
Milpitas, CA 95035

Full Name of Third/Joint Inventor Jonathan M. Goldberg

Inventor's Signature _____ Date _____

Residence San Francisco, California Citizenship USA
(City, State) (Country)

Post Office Address 422 6th Avenue
San Francisco, CA 94118

Full Name of Fourth/Joint Inventor _____

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City, State) (Country)

Post Office Address _____

APPENDIX A

William E. Alford, Reg. No. 37,764; Farzad E. Amini, Reg. No. 42,261; William Thomas Babbitt, Reg. No. 39,591; Carol F. Barry, Reg. No. 41,600; Jordan Michael Becker, Reg. No. 39,602; Lisa N. Benado, Reg. No. 39,995; Bradley J. Berezna, Reg. No. 33,474; Michael A. Bernadieu, Reg. No. 35,934; Roger W. Blakely, Jr., Reg. No. 25,831; R. Alan Burnett, Reg. No. 46,149; Gregory D. Caldwell, Reg. No. 39,926; Andrew C. Chen, Reg. No. 43,544; Thomas M. Coester, Reg. No. 39,637; Donna Jo Coningsby, Reg. No. 41,684; Florin Corie, Reg. No. 46,244; Dennis M. deGuzman, Reg. No. 41,702; Stephen M. De Klerk, Reg. No. 46,503; Michael Anthony DeSanctis, Reg. No. 39,957; Daniel M. De Vos, Reg. No. 37,813; Sanjeet Dutta, Reg. No. 46,145; Matthew C. Fagan, Reg. No. 37,542; Tarek N. Fahmi, Reg. No. 41,402; George Fountain, Reg. No. 37,374; James Y. Go, Reg. No. 40,621; James A. Henry, Reg. No. 41,064; Libby N. Ho, Reg. No. 46,774; Willmore F. Holbrow III, Reg. No. 41,845; Sheryl Sue Holloway, Reg. No. 37,850; George W. Hoover II, Reg. No. 32,992; Eric S. Hyman, Reg. No. 30,139; William W. Kidd, Reg. No. 31,772; Sang Hui Kim, Reg. No. 40,450; Walter T. Kim, Reg. No. 42,731; Eric T. King, Reg. No. 44,188; George Brian Leavell, Reg. No. 45,436; Kurt P. Leyendecker, Reg. No. 42,799; Gordon R. Lindeen III, Reg. No. 33,192; Jan Carol Little, Reg. No. 41,181; Robert G. Litts, Reg. No. 46,876; Joseph Lutz, Reg. No. 43,765; Michael J. Mallie, Reg. No. 36,591; Andre L. Marais, under 37 C.F.R. § 10.9(b); Paul A. Mendonsa, Reg. No. 42,879; Clive D. Menezes, Reg. No. 45,493; Chun M. Ng, Reg. No. 36,878; Thien T. Nguyen, Reg. No. 43,835; Thinh V. Nguyen, Reg. No. 42,034; Dennis A. Nicholls, Reg. No. 42,036; Daniel E. Ovanezian, Reg. No. 41,236; Kenneth B. Paley, Reg. No. 38,989; Gregg A. Peacock, Reg. No. 45,001; Marina Portnova, Reg. No. 45,750; William F. Ryann, Reg. No. 44,313; James H. Salter, Reg. No. 35,668; William W. Schaal, Reg. No. 39,018; James C. Scheller, Reg. No. 31,195; Jeffrey Sam Smith, Reg. No. 39,377; Maria McCormack Sobrino, Reg. No. 31,639; Stanley W. Sokoloff, Reg. No. 25,128; Judith A. Szepesi, Reg. No. 39,393; Vincent P. Tassinari, Reg. No. 42,179; Edwin H. Taylor, Reg. No. 25,129; John F. Travis, Reg. No. 43,203; Joseph A. Twarowski, Reg. No. 42,191; Tom Van Zandt, Reg. No. 43,219; Lester J. Vincent, Reg. No. 31,460; Glenn E. Von Tersch, Reg. No. 41,364; John Patrick Ward, Reg. No. 40,216; Mark L. Watson, Reg. No. 46,322; Thomas C. Webster, Reg. No. 46,154; and Norman Zafman, Reg. No. 26,250; my patent attorneys, and Firasat Ali, Reg. No. 45,715; Justin M. Dillon, Reg. No. 42,486; Thomas S. Ferrill, Reg. No. 42,532; and Raul Martinez, Reg. No. 46,904, my patent agents, of BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP, with offices located at 12400 Wilshire Boulevard, 7th Floor, Los Angeles, California 90025, telephone (310) 207-3800, and James R. Thein, Reg. No. 31,710, my patent attorney with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

APPENDIX B

Title 37, Code of Federal Regulations, Section 1.56 Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclosure information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) Prior art cited in search reports of a foreign patent office in a counterpart application, and
 - (2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.
- (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made or record in the application, and
- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
 - (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
 - (2) Each attorney or agent who prepares or prosecutes the application; and
 - (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.
- (d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

003386.P002X2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
David L. GILMOUR, et al.)	Examiner: Not yet assigned
)	
Serial No.: New application)	Art Unit: Not yet assigned
)	
Filing Date: Herewith)	
)	
For: METHOD AND SYSTEM FOR)	
ADDRESSING A COMMUNICATION)	
FOR TRANSMISSION OVER A)	
NETWORK BASED ON THE)	
<u>CONTENT THEREOF</u>)	

Assistant Commissioner for Patents
Washington, D.C. 20231

APPOINTMENT OF ASSOCIATE ATTORNEY

Sir:

I hereby appoint André L. Marais as my associate attorney in the above-entitled application, to prosecute this application, to make alterations and amendments therein, and to transact all business in the Patent and Trademark Office connected therewith.

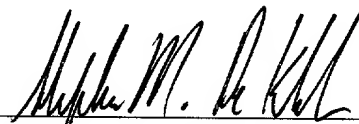
Please continue to address all future communications to Blakely, Sokoloff, Taylor & Zafman LLP, 12400 Wilshire Blvd., Seventh Floor, Los Angeles, CA 90025-1026.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN, LLP

Date: 10/31, 2000

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, CA 90025-1026
(408) 720-8598



Stephen M. De Klerk
Registration No. 46,503